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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Crops Research Division
Vegetables and Ornamentals Research Branch
Potato, Onion and Root Crop Section
Beltsville, Maryland

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THE NATIONAL POTATO-BREEDING PROGRAM, 1959

By
Robert V. Akeley and Others,
and
State Cooperators

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(Thirtieth Annual Report to Cooperators)
Plant Industry Station
Beltsville, Maryland

March 1960

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TABLE OF CONTENTS

	<u>Page</u>
NATIONAL POTATO-BREEDING PROGRAM, 1959	I
By Robert V. Akeley, USDA, Plant Industry Sta., Beltsville, Md.	
Recent introductions	I
UNITED STATES DEPARTMENT OF AGRICULTURE:	
Plant Industry Station, Beltsville, Md., and Chapman and Aroostook Farms, Presque Isle, Maine	1
By R. V. Akeley, USDA, Beltsville, Md; A. E. Schark, Presque Isle, Maine; R. W. Buck, Jr., R. E. Webb, M. J. O'Brien, G. V. C. Houghland and E. S. Schultz, USDA, Beltsville, Md.	
Distribution	1
Chapman Farm, Maine	3
Aroostook Farm, Presque Isle, Maine	4
Yield tests	4
Scab resistance	7
Verticillium Wilt Resistance in Variety and Seedling Tests	8
By A. E. Schark, USDA, Presque Isle, Maine, R. V. Akeley, USDA, Beltsville, Md., and F. E. Manzer, Maine Expt. Sta., Orono, Maine	
Varietal reaction to net necrosis and stem end browning	11
Late blight injury as reflected in yield and percentage of solids	11
Golden Nematode Resistance	12
By R. V. Akeley, USDA, Beltsville, Md.; L. C. Peterson, Long Island, N. Y. and A. E. Schark, Presque Isle, Maine	
Dates of seed cutting and dehydration	12
Quality studies	13
Solanum Species and Hybrids	16
By R. W. Buck, Jr., USDA, Beltsville, Md.	
Potato Disease Investigations	16
By R. E. Webb, E. S. Schultz, Muriel O'Brien, R. V. Akeley, R. W. Buck, Jr., USDA, Beltsville, Md. and Allen Schark, USDA, Presque Isle, Maine	
Late blight resistance	16
Resistance to virus A	22
Virus X resistance	23
Virus Y resistance	26
Further Evaluations of Solanum Species and Species Hybrids for Resistance to Disease	29
By R. E. Webb and E. S. Schultz, USDA, Beltsville, Md.	
Materials and methods	29
Resistance to viruses A and X in <i>S. tuberosum</i> L (andigena)	32
Resistance to graft inoculation with virus X	32
Resistance to virus Y	32
Multiple resistance to virus diseases	32
Resistance to disease of some foreign potato varieties	32

UNITED STATES DEPARTMENT OF AGRICULTURE, continued:	Page
Inter-Regional Potato Introduction Project	34
By R. W. Hougas, USDA, and R. W. Ross, Wisc. Agr. Exp. Sta., Madison, Wisc.	
Genetics and cytogenetics of the tuber-bearing solanum species-	35
By R. W. Hougas, USDA, and S. J. Peloquin, USDA, Wisc. Agr. Exp. Sta., Madison, Wisc.	
North Central Regional Trials, 1959	37
By August E. Kehr, USDA, Beltsville, Md. and cooperators	
Yields	38
Maturity	38
Percentage solids	38
Scab resistance	38
Over-all merit ratings	38
Pacific Northwest	43
By Darrel R. Bienz, USDA, Idaho Branch Sta., Aberdeen, Idaho	
Potato breeding	43
Variety testing and verticillium and scab resistance	43
Processing characteristics	45
Fusarium eumartii resistance trials, Aberdeen	45
Leafroll resistance test, Parma	46
Greenhouse leafroll resistance test	48
Greenhouse test for resistance to verticillium wilt	49
Potato breeding techniques	50
Southern Project	52
By T.P. Dykstra, USDA, La. State Univ., Baton Rouge, La.	
Seedling yield tests	52
CALIFORNIA	56
By Glenn N. Davis, Calif. Agr. Exp. Sta., Davis, Calif.	
CANADA	58
By G. R. Johnston and R. G. Rowberry, Ontario Agr. College, Guelph	
COLORADO	61
By J. L. Weigle, C. W. Frutchev and A. M. Binkley, Colorado Univ., Fort Collins, Colorado	
Variety trials	61
Breeding program	63
CONNECTICUT	68
By Arthur Hawkins, Agr. Exp. Sta., Storrs, Conn.	
DELAWARE	71
By E. P. Brasher, Del. Agr. Exp. Sta., Newark, Del.	
Yield and solids tests of varieties, strains and seedlings	71
Size and shape of Delus seedpieces	72
Spacing trials	72
Evaluation of hormones	73

FLORIDA:

By A. H. Eddins, Fla. Agr. Exp. Sta., Hastings, Fla.	
Resistance of potato varieties and seedling selections to corky ringspot	74

By E. N. McCubbin and A. H. Eddins, Fla. Agr. Exp. Sta., Hastings, Fla.	
Replicated variety yield test	75
Experimental	75
Recovery from freeze damage	75

GEORGIA	78
---------------	----

By J. E. Bailey, Ga. Mt. Br. Sta., Blairsville, Ga.	
---	--

IDAHO	79
-------------	----

By W. M. Iritani and D. R. Bienz, Idaho Br. Sta., Parma, Idaho	
Potato variety trials	79

IOWA	82
------------	----

By Lind Sanford, James C. Horton, Edwin T. Hibbs, Wallace H. Orgell and Oscar V. Carlson, Iowa Agr. Exp. Sta., Ames, Iowa	
Seed and seedling production	82
Increase plots	82
3-Hill test	82
Iowa yield trials	82
North Central yield trial	83
Muscatine Iowa yield trial	83
Experiment to study heterosis in potatoes and to determine which of six tester stocks is superior	83
Insect resistance studies	84
Methods of observation and sampling	88

KANSAS	92
--------------	----

By J. K. Greig and C. V. Hall, Kans. Agr. Exp. Sta., Manhattan, Kans.;	
Erwin Abmeyer and Elbert Eshbaugh, NE Kans. Exp. Fld., Wathena, Kans.;	
Floyd Davidson, Br. Agr. Exp. Sta., Garden City, Kans., and Evans E. Banbury, Br. Agr. Exp. Sta., Colby, Kans.	

KENTUCKY	93
----------------	----

By D. J. Cotter, Univ. of Ky. Agr. Exp. Sta., Lexington, Ky.	
--	--

LOUISIANA	95
-----------------	----

By Julian C. Miller, La. Agr. Exp. Sta., Baton Rouge, La.	
Selection trials	96
Resistance to late blight	99
Equality studies	99
Pollen studies	100

MAINE:

By Hugh J. Murphy, Maine Sta., Allen E. Schark, USDA, Presque Isle, Maine and Michael Goven, Maine Sta., Orono, Maine	
Variety trials	101

MAINE, Continued:

By G. W. Simpson, Reiner Bonde, F. E. Manzer, C. D. Easton, Maine Agr. Exp. Sta., Orono, Maine; R. V. Akeley, USDA, Beltsville, Md., A. E. Schark, USDA, Presque Isle, Maine and Donald Merriam, Maine Agr. Exp. Sta., Orono, Maine

Leafroll-resistant seedlings ----- 106

By R. Bonde, F. E. Manzer, C. D. Easton, Maine Agr. Exp. Sta., Orono, Maine; R. V. Akeley, USDA, Beltsville, Md.; A. E. Schark, USDA, Presque Isle, Maine, and Donald Merriam, Maine Agr. Exp. Sta., Orono, Maine

Ring rot resistance studies ----- 111

MASSACHUSETTS:

By Martin E. Weeks and David Field, Mass. Agr. Exp. Sta., Amherst, Mass.

Farm cooperative tests ----- 115

By Robert A. Mullaney, Eastern States Farmers' Exchange, West Springfield Mass.

1959 Potato yield tests ----- 117

MICHIGAN -----

120

By N. R. Thompson, D. R. Isleib, E. J. Wheeler, W. J. Hooker and J. N. C. Meduswesi, Mich. Agr. Exp. Sta., East Lansing, Mich.

MINNESOTA -----

124

By F. I. Lauer, O. C. Turnquist, R. Mullin, A. W. Blomquist, C. J. Eide, K. W. Knutson, Minn. Agr. Exp. Sta., St. Paul, Minn.

Common scab ----- 127

Field resistance to late blight ----- 128

MISSISSIPPI -----

129

By W. S. Anderson, Miss. Agr. Exp. Sta., State College, Miss.

NEBRASKA -----

130

By R. B. O'Keefe, H. O. Werner and R. T. Miyoshi, Nebr. Agr. Exp. Sta., Lincoln, Nebr.

Development of new potato varieties with superior disease resistance, yield and quality ----- 130

Hybridization and seedling production ----- 130

First year clonal increase of 1957-58 seedlings in the field ----- 130

Maintenance and screening of the total clonal population ----- 131

Large scale testing and increase of advanced lines ----- 131

Indexing for disease-free potato seed stocks ----- 132

Production of virus-X-free potato seed stocks ----- 132

Screening clonal material for heat and drouth resistance ----- 133

Susceptibility of Nebraska-grown potato varieties to

Verticillium wilt ----- 134

Adaptability of Nebraska selections to production in Gulf

Coast area ----- 134

Potato variety trials, 1959 ----- 137

NEBRASKA, Continued:

Breeding potato parental lines for resistance to scab, heat and drouth: Contributing to: NC-35 potato improvement through parental line breeding	142
Scab resistant parental lines	142
Genetic studies and development of heat and drouth resistant parental lines	143
Development of potato chipping varieties suitable for production in Nebraska	144

NEW HAMPSHIRE:

By Allen E. Schark, H. J. Murphy and M. J. Goven, USDA, Presque Isle, Maine; and P. T. Blood, N. H. Agr. Exp. Sta., Durham, N. H.	
Variety yield tests	147
By Paul T. Blood, N. H. Agr. Exp. Sta., Durham, N. H.	
Supplementary variety yield test	149

NEW JERSEY

By John C. Campbell, N. J. Agr. Exp. Sta., New Brunswick, N. J.	150
Simonson experiment	150
Seabrook experiment	151
Dey demonstration	153

NEW YORK:

By L. C. Peterson and R. L. Plaisted, Cornell Agr. Exp. Sta., Ithaca, N. Y.	
1959 Potato breeding program	154
Recurrent selection for high specific gravity	154
Rate of approach to homozygosity	156
Inbreeding and testcrossing	156
1958 testcross results	156
Golden nematode	157
S. andigenum	158
Black spot	158
Blight and scab	158
By Richard L. Sawyer, Cornell Agr. Exp. Sta., Ithaca, N. Y.	
Potato variety trials on Long Island	160
By Elmer E. Ewing and Ora Smith, Cornell Agr. Exp. Sta., Ithaca, N.Y.	
Potato variety trials in four New York counties	162

NORTH DAKOTA

By Robert Johansen, A. P. Benson and E. P. Lana, N. D. Agr. Exp. Sta., Fargo, N. D.	
Potato crossing program	169
Greenhouse and field seedlings	169
Advanced selections	169
Variety trials	170
Chipping tests	171
Testing for disease resistance	172

OHIO:

By Floyd Lower, County Agr. Agent, Lisbon, Ohio	
Chipping and table stock varieties -----	181
By J. P. Sleesman, Ohio Agr. Exp. Sta., Wooster, Ohio	
Insect resistance -----	184

PENNSYLVANIA ----- 189

By J. D. Harrington and E. C. Pifer, Pa. State Univ., Univ. Park, Pa.	
Experimental conditions - Centre county -----	189
Experimental conditions - outlying counties -----	189
Results -----	189

RHODE ISLAND ----- 193

By James E. Sheehan, R. I. Agr. Exp. Sta., Kingston, R. I.	
Variety yield trials -----	193

SOUTH CAROLINA ----- 195

By W. R. Sitterly and W. C. Barnes, S.C. Agr. Exp. Sta., Charleston, S.C.	
Potato variety trial, 1959 -----	195
Potato observational trial, 1959 -----	195
Results and conclusions -----	196

TENNESSEE ----- 198

By T. R. Gilmore, Plateau Exp. Sta., Crossville, Tenn.	
Potato yield test -----	198

TEXAS ----- 199

By Bruce A. Perry, Winter Garden Exp. Sta., Crystal City, Texas;	
R. V. Akeley and A. E. Kehr, USDA, Beltsville, Md.; D. M. McLean,	
Texas Exp. Sta. No. 15, Weslaco, Texas; D. R. Paterson, Tex. Agr. Exp.	
Sta., College Station, Texas; J. M. Coruthers, Tex. Agr. Exp. Sta.,	
Prairie View, Texas, W. B. Cook, Missouri Pacific Lines, Houston, Tex.,	
and H. M. Meyer, Missouri Pacific Railroad, Harlingen, Texas	
Screening and evaluation of potato varieties and breeding lines ----	199

VIRGINIA:

By Flood S. Andrews, Va. Agr. Exp. Sta., Blacksburg, Va.	
Varietal tests -----	208
Experimental tests -----	208
Potato seed source studies -----	209
By M. M. Parker, Va. Truck Exp. Sta., Norfolk, Va.	
Varietal tests -----	212

WASHINGTON:

By S. B. Locke, Wash. Agr. Exp. Sta., Pullman, Washington	
Resistance to leafroll and mosaic viruses -----	214
By William G. Hoyman, Irrigation Exp. Sta., Prosser, Washington	
Resistance to leafroll, Virus Y and Verticillium albo-atrum -----	216

WEST VIRGINIA	220
By K. C. Westover and J. R. Schumaker, Agr. Exp. Sta., Morgantown, W. Va.	
Variety trials	220
WISCONSIN:	
By R. H. Larson, Wis. Agr. Exp. Sta., Madison, Wis. and R. V. Akeley, USDA, Beltsville, Md.	
Nonparasitic internal tuber necrosis	223
By F. J. Stevenson, USDA, Collaborator and C. E. Cunningham, Red Dot Foods, Inc., Madison, Wis.	
Red Dot potato-breeding program	224
Seed	224
New Seedlings	224
Seedling varieties second year in field	224
Early variety test, Alabama, 1959	225
Late and medium-late variety test, Alabama	226
Early variety test, Rhinelander, Wisconsin	228
Medium and late variety test, Rhinelander	230
Chip color	231
Verticillium wilt tests, Rhinelander	232
WYOMING	234
By William A. Riedl, Agr. Exp. Sta., Laramie, Wyo.	
Potato breeding work	234
Potato variety trials	234

NATIONAL POTATO-BREEDING PROGRAM, 1959
By Robert V. Akeley

Recent Introductions

Redskin (B 2368-4), selected from a cross between Pontiac and B 400-1, is a high-yielding red selection with resistance to scab and net necrosis due to leafroll. In general, it is superior to Sebago, Katahdin and Pontiac in yielding ability and solids content when grown in Maine, Pennsylvania, Delaware, Iowa, Florida and Texas.

Fundy, a selection from a cross between Keswick and X96-56, is a new variety developed within the National Potato-Breeding Program of Canada. It is early to mid-season in maturing and superior to most varieties in appearance of its tubers, which are shallow-eyed and attractive. It is similar to Irish Cobbler and slightly better than Katahdin in yielding ability when grown in New Brunswick. Although rated as medium in dry-matter content, it has excellent cooking qualities, both for baking and boiling purposes. It carries the R₁ gene for late blight resistance.

Catoosa, tested as TL 6279 from a selfed progeny of TL 1859, is a medium-early, high-yielding, smooth, red variety immune from the common races of the late blight and resistant to scab. The total solids content of Catoosa is as high or higher than that of standard varieties grown in the South. Its tubers when boiled, baked, or fried, are rated as average in mealiness, desirable texture and white color.

Navajo and Blanca, sibs selected from a cross between USDA seedlings X627-164 and B 929-32, are smooth, white-skinned varieties with oval to round tubers, slightly flattened. Their plants are medium-maturing and medium in height and they produce yields of tubers similar to those of Katahdin and are usually higher in total solids. The scab resistance of Blanca is better than that of Navajo. Both varieties possess good cooking qualities for baking and boiling except Navajo, whose tubers tend to slough off when boiled too long. The tubers of both varieties when freshly harvested and also when reconditioned after cold storage were satisfactory for chipping.

Erendira, a selection from a cross between USDA Ac No. 24891 and X528-170, is a bushy, medium-late variety released by the Rockefeller Foundation, Mexico, and the United States. The multigenic (field) late blight resistance of Erendira is sufficiently higher to enable it to produce good to excellent yields in Central Mexico with no fungicide sprays. Small farmers who grow it as a basic crop produce over 400 bushels per acre in unsprayed fields. Late blight resistant varieties such as Kennebec and Cherokee produce nothing when grown under similar conditions.

Anita, Bertita and Conchita are three recent selections developed and released in Central Mexico because of their field resistance to late blight which permits the production of high yields even in unsprayed fields. Anita, a seedling from a self-pollination of a selection from USDA Ac No. 25953 and B 2131-3, is a late-maturing variety that produces light-reddish colored tubers with cream-colored flesh. Bertita and Conchita were selected from a self-pollination of

II

a selection from USDA Ac No. 25953 x USDA Ac No. 25959. Both varieties are medium in maturity and have smooth tubers with few and superficial eyes. Bertita has cream-colored flesh and Conchita has yellow-colored flesh.

Bounty (156.48-2x) was released by Nebraska in 1959. It compares with Red Pontiac and Red LaSoda in tuber size when grown in Nebraska and its tubers are much better in type and higher in solids than these two reds when grown in Nebraska.

Allehanna is a selection recently released by Dr. E. L. Nixon at Camp Potato near Couderspart in Northern Pennsylvania. It is reportedly a short season (early) variety with tubers that have delicious flavor, shallow eyes and fine appearance, uniformity in size and are high in solids. Allehanna also produces a heavy yield of good shipping tubers.

PLANT INDUSTRY STATION (Beltsville, Md.) and
CHAPMAN AND AROOSTOOK FARMS (Presque Isle, Maine)

R. V. Akeley, A. E. Schark, R. W. Buck, Jr., R. E. Webb,
M. J. O'Brien, G. V. C. Houghland and E. S. Schultz

Plant Industry Station

The usual crossing and selfing of parents was carried out at Plant Industry Station, Beltsville, Md. in 1958. Conditions were favorable for hybridizing and for setting of seedballs. Over 350 new lines varying from 15 to 3500 seeds per line were obtained. The following disease-resistant factors were involved: late blight, scab, ring rot, leaf roll and net necrosis, verticillium wilt, brown rot, corky ringspot; virus X, A, Y and S; and resistance to leafhoppers and nematodes. Parental selection was also based on horticultural characters such as total solids, tuber color, yielding ability, fertility and maturity. Approximately 47,000 seedlings were grown from true seed to tubers in the greenhouse and distributed to 12 cooperators (P. I. table 1).

Distribution

As usual, the distribution of potato seed, new seedlings, and varieties was continued. A summary of the shipments is given in P. I. tables 1, 2, and 3. The seed, new seedlings, and small lots were sent from Plant Industry Station, but many of the larger shipments were made directly from Maine.

P. I. table 1.--Distribution of potato seed and new seedlings from greenhouse at Beltsville, Md., 1959.

Country or State	Cooperator	Number of progenies	Number	
			Tubers	Seeds
Australia	W. Hartley	22		6,000
California	G. N. Davis	5	600	
Colorado	W. C. Edmundson	22		12,750
Colorado	J. G. McLean	50	7,934	
Louisiana	T. P. Dykstra	14		3,600
Louisiana	T. P. Dykstra	28	2,700	
Maine	A. E. Schark	159	26,178	
Maine	G. W. Simpson	22	6,934	
Maine	F. E. Manzer	12		3,475
Maine	R. Bonde	5		1,350
Minnesota	F. Lauer	2		1,000
Mexico	J. S. Niederhauser	38	2,727	
New York	R. L. Plaisted	1		300
North Carolina	F. L. Haynes, Jr.	7	813	
Ohio	J. P. Slesman	7	802	
Peru	C. Ochoa	11		1,830
Philippines	R. F. Verzosa	10		4,700
Texas	B. Perry	180	22,322	
Washington	W. G. Hoyman	20		10,000
Washington	W. G. Hoyman	20	4,264	
Washington	B. J. Landis	3		897
West Virginia	K. C. Westover	20	2,079	
Wisconsin	F. J. Stevenson	35	6,020	

P. I. table 2.--Distribution of named and numbered varieties to foreign countries, 1959.

Country	Cooperator	Number of varieties
Brazil	Dr. Drummond	7
Brazil	F. F. Guimaraes	10
Bulgaria	H. L. Hyland	14
Canada	G. R. Johnston	2
Canada	J. A. Menzies	4
Chile	M. Cox	14
Colombia	H. D. Thurston	1
Czechoslovakia	Z. Prasilik	12
New Zealand	R. G. Robinson	4
Netherlands	G. A. Thijn	1
Netherlands	Wolf and Wolf	4
Pakistan	R. G. Hopkins	20
Poland	V. Blassezac	12
Russia	H. L. Hyland	25
South Africa	J. E. Van der Plank	10
Spain	P. de la Hera y Saenz	9
Sudan	H. H. Fisher	8

P. I. table 3.--Distribution of named and numbered varieties to States, 1959.

State	Cooperator	Number of varieties
California	G. N. Davis	28
Colorado	C. W. Frutchey	1
Colorado	J. G. McLean	33
Connecticut	A. Hawkins	18
Delaware	E. P. Brasher	12
Florida	W. T. Scudder	11
Florida	E. W. McCubbin	45
Florida	A. H. Eddins	23
Georgia	J. E. Bailey	18
Hawaii	D. C. McGuire	13
Indiana	K. W. Johnston	2
Iowa	L. Sanford	2
Kansas	J. K. Greig	2
Kentucky	D. J. Cotter	26
Louisiana	J. C. Miller	2
Louisiana	T. P. Dykstra	3
Maine	A. E. Schark	5
Maine	R. E. Webb	1,117
Maryland	A. E. Kehr	20
Maryland	W. Smith	4
Maryland	C. C. Craft	5
Massachusetts	W. G. Colby	21
Michigan	N. R. Thompson	2
Minnesota	F. Lauer	4
Minnesota	O. C. Turnquist	2
Minnesota	E. O. Ueland	3

Continued

P. I. table 3 continued.

State	Cooperator	Number of varieties
Missouri	U. N. Lambeth	2
Montana	L. A. Yager	25
Nebraska	H. O. Werner	2
New Jersey	J. C. Campbell	93
New Hampshire	P. Blood	18
New York	S. A. Alfieri, Jr.	1
New York	E. E. Ewing	14
New York	R. L. Sawyer	21
New York	R. L. Plaisted	2
New York	L. C. Peterson	136
North Carolina	F. Haynes, Jr.	1
North Dakota	R. H. Johanson	5
Ohio	F. Lower	9
Ohio	D. Comin	2
Pennsylvania	W. R. Mills	1
Pennsylvania	J. D. Harrington	18
Rhode Island	J. E. Sheehan	27
South Dakota	C. M. Nagel	37
Texas	J. M. Coruthers	23
Texas	B. Perry	760
Virginia	F. S. Andrews	9
Virginia	M. M. Parker	16
Washington	R. Kunkel	29
Washington	W. G. Hoyman	10
Wisconsin	H. M. Darling	45
Wisconsin	R. H. Larson	7
Wisconsin	G. H. Rieman	2

Chapman Farm, Maine

Six named varieties and 23 seedling selections were grown for increase on the Chapman Farm for evaluation tests of horticultural and quality characteristics and for shipment to cooperators for yield trials.

A summary of the maturity and fertility data on the 10-hill rows grown on the Chapman Farm in 1959 is given in P. I. table 4. Field fertility is measured by the relative number of seedballs produced per plant. Of a total of 1063 selections grown in 1959, 55 percent were judged early or medium in maturity and 2 percent good to medium in fertility. Over 90 percent of the seedlings were unfruitful. The most likely cause of this lack of fertility was due in part to the hot and dry growing conditions that existed at flowering time in July.

P. I. table 4.--Maturity and fertility of seedlings grown in 10-hill rows on Chapman Farm, 1959.

Maturity classes	Seedlings		Fertility classes ^{1/}	Seedlings	
	No.	Pct.		No.	Pct.
Early	272	25.6	None	931	91.0
Medium	313	29.4	Slight	72	7.0
Late	353	33.2	Medium	14	1.4
Very late	125	11.8	Good	6	.6
Total	1063	100.0		1023	100.0

^{1/} Based on the relative number of seedballs set in the field.

Approximately 26,485 seedlings representing 158 family lines previously grown in the greenhouses at Beltsville, Maryland were planted at Chapman Farm for increase and selection. The germination of the seedlings was 95 percent. About 3.5 percent (949 seedlings) were selected at harvest time for increase in 10-hill rows and inclusion in 10 or more disease and quality tests in 1960. (P. I. table 5)

P. I. table 5.--Single-hill seedlings grown on the Chapman Farm in 1959 showing the total number planted, grown, selected and the number of selections reserved for future tests in 1960.

Planted	Grown	Selected	Late Blight	Scab	Ring rot	Viruses.			Leaf- roll	Vert. wilt	Golden nematode	Brown rot	Corky ringspot
No.	No.	No.	No.	No.	No.	A	X	Y	No.	No.	No.	No.	No.
26,485	24,885	949	797	588	402	532	310	425	538	365	118	62	21

Aroostook Farm, Presque Isle, Maine

In Northern Maine in 1959 the growing season was unusual in some respects. The weather and soil conditions for the first 2 weeks of May were ideal for planting but by the end of May cold and wet conditions occurred, resulting in considerable seedpiece decay for the late-planted seed. During July and the first part of August, hot and dry conditions prevailed, followed by cool, wet and cloudy weather into September when most of the potato yields were being produced. The solids content of the potatoes was lower this year than normally expected due to these climatic conditions. The average percentages of solids this year for Irish Cobbler were 17.9; Katahdin, 15.3; and Green Mountain, 17.2 but normally the percentages would be about 19.0, 18.9, and 21.0 respectively.

Approximately 56 named and 75 numbered varieties were grown for increase on the Aroostook Farm. Avon, Fundy, Norgleam, Nordak and Norland were among those that were increased. Also, 385 varieties and selections were grown for observation, distribution, and parents in the breeding plot and 90 varieties were grown in 20-hill rows in the variety collection. Five seedlings were increased for Florida and about 294 for Texas.

Sixty-two seedlings of the Texas material were third-year selections and 294 were second-year selections. This material is being maintained in Maine while samples from them are being tested for adaptation when grown in Texas.

All experimental plots were planted between the 7th and 28th of May. The early, Medium, and late yield trials were planted from May 9th to May 11th. Eleven-hundred pounds of a 10-15-15 fertilizer were applied per acre to all plots at planting time. A weekly spray consisting of Dithane and DDT was applied from June 23 to September 6. On July 28 and August 17 parathion was added to the spray mixture. Following rotobating the vines of the varieties included in all the yield tests were sprayed with sodium arsenate (Sept. 9). The yield tests were harvested September 15 and 16.

Yield Tests

Twenty-six early-maturing varieties and Antigo were compared for yielding ability, solids content, and chip color with Cherokee and Irish Cobbler (P. I. table 6). The red seedling B 4312-21 is resistant to late blight and scab but susceptible to ring rot and viruses X and Y. Its yield of 561 cwt.

(935 bu.) per acre is unusually high but unfortunately, it is the lowest of all the seedlings in total solids. Seedling B 3556-12 had the lowest yield in cwt. per acre and the highest percentage of total solids. The most desirable average tuber weight is between 5 and 7 ounces. B 3556-12 with tuber weights of 3.5 ounces had the smallest average and B 4093-18 with 8.9 ounces had the largest. Both averages are unsatisfactory. Chip color ratings of 7 or lower are considered satisfactory. Very few of the selections in this test would meet this requirement.

P. I. table 6.--Early maturity yield test, Arcostook Farm, Presque Isle, Maine, 1959.

Variety	U. S. No. 1 tubers per acre ^{1/}			Potato chip color ^{2/}		
	Cwt.	Pct.	Ave. wt. Oz.	Solids Pct.	After harvest	38°F. storage and conditioned
B4312-21	561	97	6.1	14.2	9.7	8.2
B3309-8	484	96	7.6	14.7	8.5	8.8
F4613	453	96	6.9	15.8	7.8	10.0
B605-10	442	95	6.0	16.8	9.5	8.6
B4128-1	433	92	4.9	15.3	8.0	10.0
Cherckee	416	93	5.5	17.3	8.9	8.6
Irish Cobbler	412	90	5.2	17.9	8.8	9.6
F4713	399	95	5.9	16.6	9.2	9.8
B3876-25	392	94	5.4	17.3	8.0	10.0
96-56	389	96	5.7	17.0	9.2	9.5
B3309-4	389	91	5.0	14.4	9.4	9.3
Antigo	387	94	5.4	16.6	9.1	9.9
B4093-18	381	99	8.9	14.6	9.8	8.5
B4113-4	378	94	5.5	14.6	9.7	8.6
B3454-5	364	93	4.7	15.4	9.4	7.0
B4160-1	363	93	5.7	16.3	8.0	10.0
B3710-1	358	93	5.4	17.0	9.8	10.0
B3140-36	357	92	6.3	16.9	9.4	9.5
96-44	351	95	6.2	16.8	8.7	10.0
B3428-20	343	93	5.0	17.9	8.8	10.0
B3856-8	319	80	4.0	17.4	9.0	8.4
I1084-1	308	95	7.1	18.1	9.2	10.0
B3400-1	304	96	6.9	14.9	7.4	10.0
B3331-7	293	88	4.5	16.6	9.4	9.7
CS13091	272	71	3.7	17.6	8.6	9.4
B3172-13	267	73	3.7	18.6	7.8	8.0
B2971-14	247	87	4.4	17.5	9.6	5.7
B3114-52	225	95	7.3	17.6	8.9	8.3
B3556-12	210	60	3.5	19.4	9.1	9.4
L.S.D. 5% 49						

^{1/} To convert cwt. per acre to bushels per acre multiply by 1.666.

^{2/} Color indices based on the standard color chart of the National Potato Chip Institute. The figure 1 represents a very light color and the figure 10 a very dark color.

Thirty-one medium-maturing selections and 8 varieties were compared for yielding ability, total solids, and chip color (P. I. table 7). The Louisiana

selection La 91-78 was highest in yield per acre and ranked 12th in percentage of total solids. Seedling B 3692-4 which is field immune from virus A and carries R₁R₂ genotype for late blight resistance yielded 380 cwt. per acre of U. S. No. 1 tubers that were very satisfactory for chipping after storage at 38°F and reconditioned. B 4134-26 is resistant to late blight, scab, and ring rot and B 3837-11 to scab, verticillium wilt, and immune from virus X and A. Both selections yield along with B 3692-4 but did not compare with it for chip color ratings after storage.

P. I. table 7.--Medium-maturity yield test, Presque Isle, Maine, 1959.

Variety	U. S. No. 1 tubers per acre ^{1/}			Solids	Potato chip color ^{2/}	
	Ave. wt.				After harvest	38° storage and conditioned
	Cwt.	Pct.	Oz.	Pct.		
La 91-78	424	91	5.2	16.8	7.8	9.7
Chippewa	394	93	5.4	14.9	9.6	6.9
B4134-26	392	91	5.5	15.6	9.6	8.5
51.1-53-13	392	92	5.7	16.3	9.8	7.6
La 42-45	392	92	5.2	15.7	10.0	9.3
B3837-11	381	91	5.6	15.7	9.5	9.7
B3692-4	380	91	5.3	16.0	8.4	6.0
Onaway	374	94	6.6	15.5	9.3	7.5
Katahdin	368	94	5.6	15.3	9.5	7.0
B3353-9	367	92	5.6	15.2	8.4	7.4
B4094-21	353	95	5.8	15.5	9.2	8.7
Redbake	349	92	5.4	17.2	7.0	9.4
F503 (Fundy)	348	93	6.1	17.0	9.6	7.6
B355-35	347	89	4.8	15.8	9.0	8.6
OB2905-1	345	91	4.4	14.7	8.6	9.2
B2368-13	340	88	4.7	15.7	9.1	9.7
B4119-1	327	89	4.7	14.5	9.6	8.1
La 3769	327	89	5.5	12.2	10.0	7.9
B4170-1	325	90	5.8	14.8	10.0	9.6
X1276-185	323	91	7.2	14.1	9.2	7.7
Navajo	317	91	5.5	17.1	9.0	8.6
B3453-2	315	87	4.9	16.9	9.5	6.7
I1092-2	315	95	7.6	16.0	6.9	9.1
La 4112	314	99	10.9	14.7	7.7	9.5
B4159-2	312	85	4.8	17.5	9.3	9.2
F4631	304	92	5.6	15.1	7.9	8.2
B3401-25	294	95	6.8	14.4	10.0	8.6
B4212-1	293	85	4.7	16.1	9.7	9.4
Keswick	287	94	8.1	17.0	9.0	8.6
Wy 1122	284	92	5.5	15.4	9.4	10.0
Var 43	282	85	4.4	17.1	9.9	9.1
La 1859	277	94	7.6	14.7	10.0	8.3
B962-3	266	90	5.1	17.0	9.6	9.6
I1109-9	254	86	6.2	16.3	9.8	9.6
B3457-2	236	70	3.9	18.2	6.4	9.3
50.4-52-40	189	75	4.2	15.9	9.5	8.2
B2162-36	157	63	3.6	17.7	7.4	8.8
L.S.D. 5%	53			.8		

^{1/} See footnotes 1 and 2, table 6.

Eighteen selections and 10 named varieties were compared for yielding ability in P. I. table 8. F 5025, a Canadian seedling, was the third highest yielding selection in 1958 and again this year with a yield of 419 cwt. per acre. It was also highest in total solids (19.0%). Seedlings B 3696-13 with a yield of 437 cwt. per acre and B 3725-1 with 395 cwt. are both highly resistant to late blight, resistant to scab and immune from virus A in the field. Seedling B 4312-6, a sib of B 4312-21 mentioned in P. I. table 6, is also a high yielding red selection with scab resistance and apparently a good chipper after storage.

P. I. table 8.--Late-maturity variety yield trial, Aroostook Farm, Presque Isle, Maine, 1959.

Variety	U.S. No. 1 tubers per acre ^{1/}			Solids	Potato chip color ^{2/}	
	Cwt.	Pct.	Ave. wt. Oz.		After harvest	38° storage and conditioned
Saco	448	95	5.9	18.4	8.6	8.9
B3696-13	437	96	6.7	17.9	8.9	9.2
F5025	419	94	5.3	19.0	9.7	10.0
B3725-1	395	95	6.7	13.2	9.3	10.0
B4312-6	394	93	5.9	15.1	9.2	6.4
Redburt	392	95	6.8	16.2	9.8	9.7
B2894-24	387	96	7.7	16.1	8.2	8.5
Fl4713 (Avon)	381	97	6.4	18.0	6.8	9.4
B751-119	372	96	7.1	18.8	7.4	8.6
B3424-11	372	93	5.1	17.6	9.1	9.9
La 6279	367	97	6.7	14.2	9.6	9.9
Green Mountain	364	94	6.6	17.2	9.8	10.0
I8140-1	360	95	6.0	18.9	8.1	9.3
Knik	359	96	7.6	15.3	9.8	6.8
Katahdin	357	94	5.9	15.9	9.1	9.0
B3114-67	353	99	8.9	15.3	8.0	9.8
B4090-5	351	92	6.2	15.9	9.3	6.9
B4093-18	351	98	10.7	15.6	9.0	8.9
Rus. Sebago	336	94	5.2	15.7	8.4	8.5
F5294	326	95	6.0	17.9	9.1	9.2
B69-16	329	98	8.8	16.8	10.0	9.5
Huinkul	319	94	6.2	15.3	8.6	9.7
Ac 25830	314	87	4.9	17.4	8.9	9.2
50B9-8	314	93	9.0	14.4	10.0	9.8
X927-3	312	86	4.6	17.1	8.2	9.6
B3599-11	312	91	5.1	14.8	10.0	10.0
Red Beauty	299	92	5.5	16.9	9.9	10.0
Norkota	290	89	5.5	17.6	8.0	9.6
B3556-11	265	91	4.7	18.7	7.7	10.0
L.S.D. 5%	46					

^{1/} See footnotes 1 and 2, P. I. table 6.

Scab resistance

A summary of the data for the 1959 scab selections grown in scab-infested soil at Aroostook Farm is presented in P. I. table 9. About 18 percent or 188 of the 1019 clones tested were found free of scab but none of Green Mountain tubers escaped infection. Ninety percent of the seedling tubers had 20 percent

or less of their surface area covered with scab pustules compared to about 56 percent of the checks. Approximately 40 percent of the seedling selections had pustule type 1 or no pustules at all and only 7 checks were observed in this class.

P. I. table 9.--Summary of the data observed from the scab tests on Aroostook Farm, Presque Isle, Maine, 1959.

Material tested	Total hills	Scab free	Surface area covered ^{1/}					Pustule type ^{2/}			
			T	1	2	3	4	1	2	3	4
126 family lines	1019	188	347	372	116	1	1	213	302	323	14
Green Mountain check	1019		86	481	445	5	2	7	232	768	12

^{1/} Surface area covered: T, less than 1%; 1, 1 to 20%; 2, 21 to 40%; 3, 41 to 60%; 4, 61 to 80%.

^{2/} Type of pustule: 1, small, superficial; 2, large, but still superficial; 3, large rough pustules; 4, large rough pustules, deeply pitted.

Verticillium Wilt Resistance in Variety and Seedling Tests A. E. Schark, R. V. Akeley, and F. E. Manzer

Nine seedlings and 6 varieties were tested for wilt resistance on Aroostook Farm (P. I. table 10). Five replications of 20-hill plots per selection with seedpieces spaced at 10-inch intervals were planted in randomized blocks. Freshly-cut seedpieces of 4 replications were dipped in a slurry of the Verticillium wilt organism immediately before planting. To determine the natural infection from the soil, the fifth replication was not inoculated.

All the selections had at least 2.5 percent of their hills infested when their seedpieces were inoculated prior to planting but 5 selections remained free when planted uninoculated. Houma was the highest yielder and the most resistant selection in this test, but the correlation coefficient from a covariance analysis between disease incidence and yield was non-significant and negative. The solids content and chipping data in this test are low compared to other years but better in general than those reported in the seedling yields tests.

About 1504 selections from 115 family lines were tested in 5-hill rows for wilt resistance. Cherokee, Katahdin, and Houma were planted at intervals of 25 rows throughout the field test. Cherokee is considered susceptible, Katahdin intermediate, and Houma resistant to wilt. Although the selections were planted in infested soil, their seedpieces were also dipped in a slurry of Verticillium-albo-atrum before planting similar to the method used with the variety and seedling test.

The checks were grouped into inoculated and uninoculated to determine the effect of seedpiece inoculation in this field. On a hill basis (P. I. table 11) the inoculated seedpieces increased the incidence of wilt, especially with the Houma variety. The susceptible Cherokee had a difference of only 1 percent and the intermediate Katahdin had 12 percent. Seedpiece inoculation on varieties planted in wilt-infested soils increases the incidence of wilt-infested plants and apparently is more effective on the resistant parts.

Only 24 percent of the seedlings from the B 4616 line showed any wilt infection but the B 4509, B 4613, and B 1544 lines had from 87 to 88 percent of their clones showing 1 or more plants infected.

P. I. table 10.--Reaction to Verticillium wilt of inoculated and uninoculated seedpieces as reflected in yields and percent solids of 15 varieties of potato grown in wilt-infested soil on Aroostook Farm, Presque Isle, Maine, 1959.

Variety	Hills infected with wilt		Inoculated replications ^{1/}			
	Inoculated ^{1/}	Uninoculated ^{2/}	Yield per acre	Solids	Potato chip color	
	seedpieces	seedpieces			After	380 storage
	Pct.	Pct.			harvest	and conditioned
Houma	2.5	0	281	93	17.9	10.0
Katahdin	70.0	0	237	95	17.5	7.2
Rushmore	56.3	20.0	231	95	17.2	7.7
B 1339-12	52.5	5.0	213	92	16.6	6.9
Cherokee	76.3	35.0	212	89	18.0	7.4
La 4112	42.5	10.0	211	97	16.8	6.9
Vy 1122	15.0	0	207	96	17.0	8.2
B 2894-24	65.0	5.0	203	93	16.0	8.7
F 5025	52.5	15.0	196	86	18.5	7.9
Tawa	86.3	15.0	184	88	17.4	8.2
B 3453-2	27.5	0	182	89	19.7	7.3
Dazoc	43.7	15.0	171	91	16.6	7.6
792-94	7.5	0	166	81	16.9	6.9
792-88	16.0	10.0	161	73	16.7	10.0
B 962-3	52.5	50.0	154	86	18.1	9.5
L.S.D. 5%			33		1.1	

^{1/} Mean of 4 replications of 20 hills each.

^{2/} One replication of 20 hills.

P. I. table 11.--Reaction to Verticillium wilt of segregating potato seedling populations, and inoculated and uninoculated check varieties grown in wilt-infested soil on Aroostook Farm, Presque Isle, Maine, 1959.

Material tested	Selections tested		Selections infected		Readings based on total hills		
	No.	Pct.	No.	Pct.	Total	No. Infected	Pct.
One hundred eight family lines	881	788	89	4361	3372	77	
Houma check-inoculated	17	3	18	84	3	36	
" -uninoculated	23	0	0	110	0	0	
Katahdin check-inoculated	18	17	94	88	47	53	
" -uninoculated	23	20	94	110	45	41	
Cherokee check-inoculated	19	19	100	92	82	89	
" - uninoculated	21	18	86	97	85	88	
Segregating populations							
Pedigree	Percentage						
B 4446	B 595-76 x Katahdin	94	43	22	374	79	47
B 4509	B 3707-4 x Earlane	77	68	88	271	162	60
B 4589	Katahdin x B 1383-5	77	42	54	283	67	24
B 4613	B 3309-8 x Katahdin	94	82	87	364	154	42
B 4616	B 3139-24 x Katahdin	90	22	24	372	31	8
B 1544	Earlane selfed	99	87	88	392	181	46
B 1545	Katahdin selfed	92	43	47	364	84	23

Varietal Reaction to Net Necrosis and Stem-end Browning

Following the usual procedure of field testing in the past, 3 varieties and 6 seedlings were tested for tuber resistance to leafroll from current season infection. Viruliferous aphids from Katahdin leafroll plants were placed on all plants in this test on July 17 and 28. A parathione spray was applied on August 5. After storage for 2½ months at 50°F. the tubers from these selections were examined. Only Mohawk and Green Mountain of the 9 tested showed 3.3 and 3.5 percent tuber infection, respectively. None of the tubers from Katahdin, F 4631, B 962-3, B 3319-30, B 3428-20, B 3453-2, and B 3604-1 showed any symptoms. Also, all 9 entries were free from stem-end browning. In 1958, Mohawk had necrosis symptoms in over 68 percent of its tubers.

Late Blight Injury as Reflected in Yield and Percentage of Solids

Six varieties were exposed to a late blight epiphytotic on Aroostook Farm in 1959. Three highly-resistant varieties, Kennebec, Merrimack, and Saco; and two moderately-resistant varieties, Sebago and Menominee, were compared with the susceptible Katahdin variety. The field plot was sprayed at 7-day intervals with the treatments given in P. I. table 12. Each treatment was separated from the adjacent one by planting 2 rows of the susceptible variety Teton. On July 7, the Teton guard rows were inoculated with the "0" race of late blight grown on potted plants and then transferred to the field--one plant per guard row. Due to hot and dry conditions in July and the first of August the late blight injury was not too great. The Teton guard rows were not completely killed by the late blight infection until the end of August. From the latter part of August until the test was harvested September 29, the conditions for late blight spread and injury were favorable. The data in P. I. table 12 shows relatively little difference in yield between the DDT treatment and water or between Dithane and Dithane + DDT. Apparently insect damage was of little concern in this test in 1959. The Dithane spray did increase the yields of all varieties over those sprayed with water or DDT.

P. I. table 12.--Reaction of 6 varieties to late blight as reflected in yields and percentages solids^{1/}, Aroostook Farm, Presque Isle, Maine, 1959.

	Treatments, yield ^{2/} , and percentages solids ^{3/}													
	water			DDT			Dithane			DDT + Dithane			Means	
	U.S.No.1 tubers	solids %		U.S. No.1 tubers	solids %		U.S. No.1 tubers	solids %		U.S. No.1 tubers	solids %		U.S. No.1	solids
	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.
Katahdin	205	90	15.3	197	89	14.7	299	94	16.0	281	93	16.1	245	15.5
Kennebec	351	96	17.0	355	96	17.2	386	97	17.6	375	97	18.0	367	17.5
Menominee	237	92	15.4	248	94	15.4	319	95	17.1	321	95	17.5	281	16.4
Merrimack	274	93	18.4	279	93	17.7	301	94	17.9	284	94	17.8	285	17.9
Saco	352	94	18.1	363	95	18.5	397	95	18.1	397	95	17.8	377	18.1
Sebago	249	90	14.9	232	90	14.5	308	93	15.9	318	94	15.7	277	15.3
Means	278		16.5	279		16.3	335		17.1	329		17.2		

1/ Based on specific gravity of tubers.

2/ L.S.D. .05 level between any 2 varieties 13.2 Cwt.

" " " 2 treatments 13.1 Cwt.

" " " same variety, any 2 treatments 35.6 Cwt.

3/ L.S.D. .05 level between any 2 varieties 2.1%.

" " " 2 treatments .2%.

" " " same variety, any 2 treatments .9%.

Golden Nematode Resistance
R. V. Akeley, L. C. Peterson and A. E. Schark

The results of the 1959 test for golden nematode resistance are given in P. I. table 13. The procedure for evaluating the resistance to nematodes was the same as that used in previous years. Continuation of backcrossing resistant selections to S. tuberosum parents with multiple-disease resistance and desirable horticultural characters should eventually result in the production of commercial sorts with resistance to golden nematode combined with other disease-resistant and horticultural characters.'

P. I. table 13.--Golden nematode-resistance tests. Selections made in Maine, 1958 and tested on Long Island, N. Y. in 1959.^{1/}

Pedigree number	Parentage	Increased, Maine, 1958		Tested, N. Y., 1959	
		Grown No.	Selected No.	Susceptible No.	Resistant No.
B4472	B595-76 x B3944-11	134	4	3	1
B4473	B606-3 x B3944-11	127	7	4	3
B4476	B606-37 x B3944-11	167	5	4	1
B4494	B3397-17 x B3944-11	172	8	4	4
B4499	B3719-1 x B3944-11	327	6	3	3
B4503	B3964-1 x B3944-11	130	8	5	3
B4519	B922-6 x B3944-11	463	23	10	13
B4529	B3428-20 x B3944-11	141	18	11	7
B4535	B3556-12 x B3944-11	241	6	3	3
B4537	B3692-4 x B3944-11	170	12	9	3
B4557	WV14-17 x B3944-11	61	5	4	1
B1558	B3944-11 selfed	60	8	4	4
B1559	B3945-12 selfed	26	4	2	2
	Totals		114	66	48

^{1/} Tests were made by L. C. Peterson and co-workers on Long Island, N. Y.

Dates of Seed Cutting And Dehydration

The effects of dates of seed cutting and seed dehydration on yield were continued in 1959. The advantages of cutting seed early and dehydration of cut seed were discussed in the 1956 National Potato Breeding Program.

Starting on February 1 and at monthly intervals thereafter, 2-bushel samples of Sebago and Irish Cobbler were cut into 2-ounce seedpieces. The samples were moved into a workroom with a temperature range from 50-60°F. for 2 days before they were cut into seedpieces. Pre-warming potatoes before cutting them into seedpieces tends to give better suberization of the cut surfaces. After cutting, the seedpieces were sacked and dipped into a solution of 50 percent wettable Captan (0.4 oz. per gal.). After draining the solution off, the seedpieces were placed in a dryer with a temperature of 90°F. and held there until the specified amount of moisture was removed.

The results for Sebago are presented in P. I. table 14. The mean yield per acre for Sebago decreased from 350 cwt. for freshly cut seed to 215 cwt. for seed that had 40 percent of the moisture removed and the germination varied

from 83 to 51 percent, respectively, for the same treatments. To test the hypothesis that the differences in germination were responsible for yield reductions, a covariance analysis between yield and germination for Sebago was calculated. The mean treatment yields corrected for stand were non-significant, indicating that differences in germination were responsible for yield reductions. The common storage temperature (38-40°F.) and humidity (70-80 percent) provide good environmental conditions for mold growth which affected the seedpieces and was reflected in poor stands by field counts after planting. Future tests are being planned to determine the practicability of suberization of the seedpieces for various lengths of time before dehydration to control seedpiece infection.

The data for seed cutting dates and dehydration for Irish Cobbler are given in P. I. table 15. The results were substantially the same as those discussed in P. I. table 14 for Sebago. The mean yield for the freshly cut treatments of 316 cwt. per acre decreased gradually to 286 cwt. for that treatment in which 40 percent of the original weight of the seedpiece was removed by dehydration and the germination varied from 86 to 64 percent, respectively.

P. I. table 14.--Effect of seed cutting dates and dehydration of seed on yield^{1/} of the variety Sebago planted at Presque Isle, Maine, 1959.

Dates of cutting	Percent Moisture Removed from Seed									
	0		10		20		40		Means	
	U.S. Germin-		U.S. Germin-		U.S. Germin-		U.S. Germin-		U.S. Germin-	
	No.1 ation		No.1 ation		No.1 ation		No.1 ation		No.1 ation	
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
February	320	78	302	72	260	62	210	54	273	66
March	385	82	329	83	198	49	206	41	280	64
April	387	87	364	78	336	77	151	39	310	70
May	307	87	352	82	315	83	292	69	316	80
Mean	350	83	337	79	277	68	215	51		

^{1/} Difference between 2 dehydration means at .05 level was 56 cwt. Difference between 2 dehydration means for the same month .05 level 113 cwt.

P. I. table 15.--Effect of seed cutting dates and dehydration of seed on yield^{1/} of the variety Irish Cobbler, planted at Presque Isle, Maine, 1959.

Dates of cutting	Percent Moisture Removed from Seed									
	0		10		20		40		Means	
	U.S. Germin-		U.S. Germin-		U.S. Germin-		U.S. Germin-		U.S. Germin-	
	No.1 ation		No.1 ation		No.1 ation		No.1 ation		No.1 ation	
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
February	324	84	283	90	277	83	345	74	308	83
March	310	82	318	81	282	72	237	53	286	72
April	355	87	309	87	305	82	287	55	314	78
May	278	90	288	84	284	87	276	72	281	83
Mean	316	86	300	86	287	81	286	64		

^{1/} Difference between 2 dehydration means at .05 level 22 cwt. Difference between 2 dehydration means for the same month at .05 level 44 cwt.

Quality Studies

The potato chip and French fry indices of the potato varieties entered in the yield trials of 1958 are presented in P. I. tables 16 and 17. Yields and total

solids of these varieties are listed on pages 6 to 9 of the National Potato Breeding Program for 1958. After harvest, a 20-tuber sample from each of 4 replicates of the yield tests was saved for quality determinations. The average specific gravity of the 20-tuber samples from which total solids were estimated was taken in October. One 5-tuber lot from each sample was selected to make chips and French fries in November and stored at 50°F. until the fry tests were made. A second and third 5-tuber lot from each sample, and a number of Kennebec tubers were stored at 38°F. until the last week in December. At that time one of the 5-tuber lots and several Kennebec tubers were removed to a 60°F. room for conditioning. Potato chips were made from the Kennebec tubers at weekly intervals until the variety produced chips of acceptable color. At that time (approximately 38 days) potato chips and French fries were made from the reconditioned material. The methods used for slicing, cooking, and grading the chips and fries were the same as those used in 1958.

None of the varieties in P. I. tables 16 and 17 produced chips or fries of acceptable color when they were processed directly from 38°F. storage. About 67 percent (49) of the selections from tables 16 and 17 had better color after storage at 38°F. and reconditioning for 38 days than they did when they were processed after harvest. The greatest change was 2.5 color units, from 9.7 to 7.2, for seedling B 73-3 shown in P. I. table 16. Six of the selections changed 2 or more color units.

P. I. table 16.--Potato chip and French fry indices of potato varieties in the 1958 mid-season and late maturity yield tests.^{1,2/}

Variety	Maturity	Potato chips		French fries
		After harvest	38°F. storage and conditioned	After harvest
B2368-4	M	8.9	9.1	8.8
La 3769	M	10.0	10.0	9.2
Katahdin	M	9.1	7.1	8.6
B73-3	M	9.7	7.2	9.0
Chippewa	M	8.1	8.6	7.5
B3604-1	M	9.7	9.0	8.9
Onaway	M	9.7	9.9	9.5
Ia 1111-5	M	9.4	9.5	9.4
Rushmore	M	8.6	8.3	9.2
B3924-11	M	9.8	8.9	9.9
F4631	M	7.9	7.0	7.7
B3299-13	M	9.6	8.7	7.6
Ia 1111-8	M	6.4	6.9	6.5
B4113-4	M	10.0	9.4	9.6
B3653-15	M	10.0	9.8	9.3
B3856-8	M	9.2	8.6	8.9
F5080	M	7.1	6.3	8.9
B3114-52	M	8.7	8.9	9.2
B4094-19	M	9.7	8.6	9.2
B3873-5	M	6.1	4.5	6.2
La 3769	L	10.0	10.0	9.7
B2894-24	L	9.0	9.0	8.1
F5025	L	9.2	7.7	8.2
B2368-13	L	7.4	7.3	7.3
La 4112	L	6.6	6.0	6.3

Continued

P. I. table 16 continued.

Variety	Maturity	Potato chips		French fries
		After harvest	38°F. storage and conditioned	After harvest
F4713	L	6.2	7.1	5.9
B3516-11	L	6.4	5.9	6.4
Huron	L	10.0	10.0	9.2
Sebago	L	8.1	8.9	7.2
Green Mountain	L	10.0	8.7	9.8
Red LaSoda	L	9.4	8.1	9.0
B3453-2	L	7.8	7.4	9.4
Ganso	L	9.2	7.9	8.6
La 1859	L	9.9	9.2	9.9
B3424-11	L	9.0	9.4	8.8
F5294	L	9.6	8.0	7.4

1/ See the 1958 National Potato Breeding Program report for yield and total solids data of the selections in this table

2/ Color indices based on the standard color chart of the National Potato Chip Institute. The figure 1 represents a very light color and the figure 10 a very dark color. A color reading of 7.5 or lower indicates an acceptable potato chip.

P. I. table 17.--Potato chip and French fry indices of potato varieties in the 1958 early and mixed maturity yield tests.^{1/}

Variety	Maturity	Potato chips		French fries
		After harvest	38°F. storage and conditioned	After harvest
B4128-1	E	10.0	9.9	10.0
B3641-15	E	10.0	10.0	9.7
Cherokee	E	8.9	7.0	9.3
F4713 (Avon)	E	6.0	7.7	5.5
B3140-36	E	10.0	10.0	10.0
F503 (Fundy)	E	9.7	8.7	9.8
B3454-5	E	10.0	8.9	9.9
B605-10	E	9.5	9.4	9.8
Irish Cobbler	E	7.5	7.7	7.3
Ia 1092-2	E	6.3	6.5	5.8
B4094-23	E	9.6	8.8	9.1
Tawa	E	8.5	6.3	8.3
B3584-5	E	8.3	7.4	8.1
B3556-11	E	10.0	7.8	8.7
B3400-1	E	10.0	10.0	9.9
Ia 1109-9	E	9.9	7.9	9.7
B2971-14	E	10.0	8.3	10.0
B3391-2	E	9.1	9.0	9.1
B4116-2	E	8.4	8.3	8.1
Keswick	E	10.0	9.3	9.9
Osage	E	6.5	5.9	6.3
CS11889	E	9.0	7.7	9.2
CS11888	E	9.4	7.6	9.0
B75-4	E	6.9	7.9	6.6
Saco	L	9.2	8.7	9.0

Continued

P. I. table 17 continued.

Variety	Maturity	Potato chips		French fries
		After harvest	38°F. storage and conditioned	After harvest
B3352-8	L	8.2	8.5	8.4
B3353-9	M	9.1	8.7	8.4
Green Mountain	L	9.7	10.0	9.5
Chippewa	M	7.9	8.6	7.2
B3454-5	E	9.7	9.3	9.3
Katahdin	M	9.7	8.3	8.6
Teton	M	8.8	9.1	10.0
Sebago	L	9.1	9.4	7.6
B3876-25	E	7.6	7.0	7.8
B3604-19	E	9.4	7.2	9.9
B3428-20	E	8.3	8.1	8.4
B2858-5	M	8.9	8.5	9.1
B3454-14	E	9.8	8.7	9.9

1/ See footnotes P. I. table 16.

About 24 percent (18) of the selections cooked darker in color after storage and reconditioning. Avon in P. I. table 17 with an increase of 1.7 color units was the greatest. Most of the changes from a lighter color before storage to a darker one after storage were less than 1.0 color units.

Fourteen percent (10) of the selections when cooked produced French fries darker in color than their corresponding lots when they were fried before storage. Last year all the French fry lots were lighter in color after cooking than their counterparts that were made into chips.

Solanum Species and Hybrids

R. W. Buck, Jr.

Investigations on crossability among Solanum species and meiosis in species and interspecific hybrids were continued in 1959. Several clones of 7 tetraploid, 36 triploid, and 52 diploid hybrid combinations were grown for cytological investigations. Meiosis is regular in the diploid and tetraploid hybrids investigated.

Attempts were made to produce hybrid seed among numerous species and hybrids. Of 553 combinations among diploid species attempted, 109 produced seed. F₂ seed was obtained from 6 diploid interspecific hybrids and from 4 tetraploid hybrids. Backcrosses were obtained from 14 diploid F₁ hybrids and from 4 tetraploid F₁ hybrids.

With few exceptions, the majority of interspecific hybrids obtained to date have been vigorous plants with considerable fertility based on stainable pollen and seed production. In many instances fertility has been equal to the parent species.

Potato Disease Investigations

R. E. Webb, E. S. Schultz, Muriel O'Brien,
R. V. Akeley, R. W. Buck, and Allen Schark

Late Blight Resistance. One thousand and seventy-nine selections and 20 named

varieties were screened for resistance to late blight in the greenhouse and in the field. Race "0" was used to inoculate the plants in the greenhouse and the susceptible Green Mountain plants interplanted in the field plot. Webb tables 1 and 2 summarize the results. In the greenhouse 505 selections and 3 varieties proved highly resistant to the "0" race of late blight. In the field 152 selections susceptible to the "0" race in the greenhouse were equally resistant to blight as the variety Sebago (Webb table 1). Of the 505 selections that were highly resistant in the greenhouse test, 191 did not become infected, 10 were highly resistant, and 73 were as resistant as Kennebec under field conditions in 1959 (Webb table 2).

Weather conditions during 1959 were not favorable for an epidemic of late blight in the test plot until mid-August. As a result, physiologic races of the organism other than the races "0" and 4 were not detected until August 24. However, races 1; 2; 3; 4; 1, 4; and 2, 4 were relatively uniformly distributed in the plot on September 10.

Webb table 1.--Field resistance to late blight of selections found susceptible to the "0" race in a greenhouse test and retested in the field in 1959, Aroostook Farm, Presque Isle, Maine.

Pedigree	Parentage	Greenhouse		Relative resistance 14 days after infection in field					
		Tested	Susc.	Selection ratings					
		selec.		1	2	3	4	5	6
		No.	No.	No.	No.	No.	No.	No.	No.
B 4446	B 595-76 x Katahdin	18	6				3	3	
B 4448	B 902-2 x Saranac	12	12				8	4	
B 4453	B 2098-5 x Menominee	8	6			2	4		
B 4455	B 2331-5 x B 56-11	6	6				3		3
B 4456	B 2331-5 x B 2131-3	13	3					2	1
B 4458	B 3102-3 x B 355-24	7	2						2
B 4459	B 3191-4 x B 3195-3	3	3				2	1	
B 4460	B 3195-3 x A 144-1	15	15				14	1	
B 4461	B 3309-8 x Katahdin	32	6				2	1	3
B 4463	B 3427-7 x B 3418-10	9	3				1	2	
B 4464	B 3443-6 x B 3418-10	9	4					2	2
B 4467	B 3707-4 x ND 4521	7	3				1		2
B 4468	47156 x B 3139-24	4	3						3
B 4469	47156 x B 3672-3	3	3					1	2
B 4473	B 606-37 x B 3944-11	7	3					1	2
B 4475	B 606-37 x B 355-24	15	2				2		
B 4476	B 606-37 x B 3944-11	5	3					2	1
B 4480	B 1467-8 x B 3457-2	1	1						1
B 4481	B 1467-9 x B 3457-2	1	1				1		
B 4482	B 2067-52 x B 2068-23	9	9				2	3	4
B 4483	B 2131-5 x B 3139-24	5	3					2	1
B 4485	B 3097-82 x B 3139-24	11	1						1
B 4486	B 3116-67 x B 3139-24	2	1						1
B 4488	B 3139-24 x B 2067-52	7	5				2	1	2
B 4489	B 3309-4 x B 3139-24	6	2					1	1
B 4494	B 3397-17 x B 3944-11	8	3						3
B 4495	B 3428-20 x B 3139-24	13	3						3
B 4498	B 3457-2 x B 3813-30	2	1				1		

Continued

Webb table 1 continued.

Pedigree	Parentage	Greenhouse		Relative resistance 14 days after infection in field					
		Tested	Susc.	Selection ratings ^{1/}					
		No.	No.	1	2	3	4	5	6
B 4499	B 3719-1 x B 3944-11	6	3					2	1
B 4503	B 3964-1 x B 3944-11	8	4				1		3
B 4509	B 3707-4 x Earlane	12	4						4
B 4511	B 3707-4 x Menominee	16	5			1	1	1	2
B 4519	B 922-6 x B 3944-11	12	1						1
B 4523	B 922-6 x B 3944-11	11	1						1
B 4529	B 3428-20 x B 3944-11	18	2						2
B 4531	B 3452-2 x WV 14-17	2	1						1
B 4533	B 3556-12 x B 3692-4	7	1						1
B 4535	B 3556-12 x B 3944-11	6	1				1		
B 4536	B 3692-4 x WV 14-17	1	1						1
B 4540	B 3719-1 x WV 14-17	4	1				1		
B 4542	B 3819-3 x B 3556-12	5	1				1		
B 4544	41956 x B 606-3	5	1					1	
B 4547	WV 14-17 x Merrimack	7	1					1	
B 4548	WV 14-17 x Ac 26031	14	1					1	
B 4552	WV 14-17 x B 3114-67	11	1						1
B 4557	WV 14-17 x B 3944-11	5	1						1
B 4560	X 792-88 x B 3099-5	3	3					3	
B 4561	X 792-88 x A 124-62	5	5				1		4
B 4562	A 119-8 x B 3099-5	3	3				3		
B 4563	A 163-28 x B 3099-5	4	4				4		
B 4564	B 3099-5 x A 180-30	7	7				7		
B 4565	X 792-88 x A 180-15	7	7				6		1
B 4566	A 163-13 x A 180-30	1	1				1		
B 4568	Ontario x A 163-17	1	1						1
B 4569	B 2759-5 x A 119-15	3	3				3		
B 4570	Kennebec x A 117-52	23	4						4
B 4571	A 119-15 x B 595-76	2	2				1		1
B 4572	Sequoia x A 124-62	10	10				1	5	4
B 4574	B 922-3 x B 3139-24	16	7				2	1	4
B 4575	B 922-3 x 627-124	12	9				2	2	5
B 4576	B 595-76 x Katahdin	8	2				1	1	
B 4587	B 606-37 x B 3299-13	5	5				1	3	1
B 4584	B 2067-52 x ND 457-1	13	9				4		5
B 4588	Houma x A 144-1	9	9				1		8
B 4589	Katahdin x B 1383-5	1	1				1		
B 4590	Pontiac x B 2368-4	38	38				3	5	30
B 4591	LaSoda x B 2368-4	19	19				1	3	15
B 4593	Triumph x B 2368-4	9	9				2		7
B 4594	B 24-78 x B 3309-8	15	1						1
B 4595	B 56-11 x B 3139-24	13	8					1	7
B 4598	B 929-6 x A 144-1	10	8				1	2	5
B 4599	B 962-32 x B 2368-4	3	1					1	
B 4600	B 991-3 x B 2368-4	1	1						1
B 4601	B 991-14 x Teton	33	13				1	1	11
B 4602	B 1268-26 x A 144-1	5	5				1	3	1

Continued

Webb table 1 continued.

Pedigree	Parentage	Greenhouse		Relative resistance 14 days after infection in field					
		Tested	Susc. selec.	Selection ratings ^{1/}					
				1	2	3	4	5	6
		No.	No.	No.	No.	No.	No.	No.	No.
B 4603	B 2331-5 x B 2997-4	1	1						1
B 4604	B 2368-4 x B 2331-5	35	35				6	8	21
B 4605	B 2368-4 x B 2997-9	19	19				5	3	11
B 4606	B 2368-4 x B 3131-8	9	5				5		
B 4607	B 2997-9 x B 2331-5	8	8				1	2	5
B 4608	B 3114-12 x B 2131-3	40	9						9
B 4609	B 3131-21 x B 2368-4	6	1				1		
B 4610	B 3418-15 x Menominee	19	19				6	7	6
B 4611	B 3418-15 x B 929-6	13	9				5		4
B 4612	B 3418-15 x B 3418-10	5	5				1	1	3
B 4613	B 3309-8 x Katahdin	10	1				1		
B 4615	Mohawk x Menominee	1	1				1		
B 4616	B 3139-24 x Katahdin	16	14				3	1	9
B 4617	792-88 x B 3139-24	6	4					1	3
B 4618	Sebago x 47156	6	6				2	4	
B 1544	Earlaine X	5	5						5
B 1545	Katahdin X	5	5				3		2
B 1548	B 606-3 X	4	1						1
B 1549	B 1281-1 X	1	1						1
B 1551	B 2067-52 X	7	7					3	4
B 1552	B 2068-23 X	2	2					2	
B 1553	B 2098-5 X	2	1						1
B 1555	B 3457-2 X	1	1				1		
B 1556	B 3556-12 X	19	10				2	2	6
B 1558	B 3944-11 X	8	8					4	4
B 1559	B 3945-12 X	4	3					1	2
B 1561	A 124-62 X	1	1						1
B 1563	B 2331-5 X	5	5				1	1	3
B 1564	B 2368-4 X	21	21					3	18
B 1565	B 936-12 X	3	3						3
B 24-78	Imperia x Earlaine	1	1				1		
B 2997-9	B 874-15 x Ruska	1	1						1
B 400-1	499a x B 56-11	1	1					1	
B 3099-5	Menominee x (X 159-9)	1	1				1		
B 3299-13	B 936-12 x Katahdin	1	1						1
B 926-9	B 66-1 x (X 792-94)	1	1				1		
A 119-15		1	1				1		
B 936-12		1	1				1		
B 3418-10	Menominee x B 881-12	1	1				1		
B 1466-27	B 2067-2 X	1	1					1	
B 3140-36	B 607-72 x B 962-32	1	1					1	
B 3319-30	B 936-12 x Menominee	1	1					1	
B 3453-2	B 2368-2 x B 2662-18	1	1					1	
B 3454-5	B 2368-2 x B 2368-17	1	1					1	
	Sebago	1	1				1		

^{1/} Rating: 1, no lesions; 2, occasional lesion; 3, 1/2 of leaves affected; 4, 2/3 of leaves showing lesions; 5, all but a few leaves showing lesions; 6, plants dead.

Webb table 2.--Field resistance to late blight of selections found immune from the "0" race in a greenhouse test and retested in the field in 1959, Aroostook Farm, Presque Isle, Maine.

Pedigree	Parentage	Greenhouse		Relative resistance 7 days after infection in field					
		Tested	Susc. selec.	Selection ratings					
				1	2	3	4	5	6
		No.	No.	No.	No.	No.	No.	No.	No.
B 4446	B 595-76 x Katahdin	18	12	1	5	4	2		
B 4453	B 2098-5 x Menominee	8	2		1	1			
B 4454	B 2098-5 x B 2098-29	2	2		1	1			
B 4456	B 2331-5 x B 2131-3	13	10		8	2			
B 4458	B 3102-3 x B 355-24	7	5	2	2	1			
B 4461	B 3309-8 x Katahdin	32	24	4	6	9	4	1	
B 4463	B 3427-7 x B 3418-10	9	6	5	1				
B 4464	B 3443-6 x B 3418-10	9	5		5				
B 4467	B 3707-4 x ND 457-1	7	4	4					
B 4468	47156 x B 3139-24	4	1		1				
B 4472	B 595-76 x B 3944-11	4	4		3	1			
B 4473	B 606-3 x B 3944-11	7	4		2	1	1		
B 4475	B 606-37 x B 355-24	15	13	7	4	2			
B 4476	B 606-37 x B 3944-11	5	2			1	1		
B 4483	B 2131-5 x B 3139-24	5	2			1	1		
B 4484	B 2331-5 x B 3309-8	2	2			2			
B 4485	B 3097-82 x B 3139-24	11	10	1	3	4	2		
B 4486	B 3114-67 x B 3139-24	2	1			1			
B 4488	B 3139-24 x B 2067-52	7	2				2		
B 4489	B 3309-4 x B 3139-24	6	4				4		
B 4494	B 3397-17 x B 3944-11	8	5		1	2	2		
B 4495	B 3428-20 x B 3139-24	13	10	9					
B 4497	B 3427-7 x B 3457-2	2	2		2				
B 4498	B 3457-2 x B 3813-30	2	1	1					
B 4499	B 3719-1 x B 3944-11	6	3	2	1				
B 4503	B 3964-1 x B 3944-11	8	4	3	1				
B 4507	B 926-9 x B 606-3	3	3		1	2			
B 4508	B 3672-3 x Ac 2603	1	1	1					
B 4509	B 3707-4 x Earline	12	8	8					
B 4511	B 3707-4 x Menominee	16	11	11					
B 4512	B 3720-9 x Cayuga	3	3	3					
B 4519	B 922-6 x B 3944-11	12	11	9	1	1			
B 4520	B 595-76 x WV 14-17	1	1	1					
B 4521	B 606-37 x WV 14-17	1	1			1			
B 4522	B 922-6 x B 3139-24	13	12	9			3		
B 4523	B 922-6 x B 3944-11	11	10	7		3			
B 4529	B 3428-20 x B 3944-11	18	15	6	3	5	1		
B 4531	B 3457-2 x WV 14-17	2	1	1					
B 4533	B 3556-12 x B 3692-4	7	6	4		1	1		
B 4535	B 3556-12 x B 3944-11	6	4	2			2		
B 4536	B 3692-4 x WV 14-17	1	1	1					
B 4537	B 3692-4 x B 3944-11	12	10	5		4	1		
B 4538	B 3718-WV 4 x B 3139-24	6	6	2		2	2		
B 4540	B 3719-1 x WV 14-17	4	3	1		1	1		
B 4542	B 3819-3 x B 3556-12	5	4	1			3		

Continued.

Webb table 2 continued.

Pedigree	Parentage	Greenhouse		Relative resistance 7 days after infection in field					
		Tested	Susc.	Selection ratings					
		No.	No.	1	2	3	4	5	6
B 4543	B 3964-1 x B 355-24	2	2	1		1			
B 4544	41956 x B 606-2	5	4	2		1	1		
B 4546	WV 14-17 x Menominee	10	10	9			1		
B 4547	WV 14-17 x Merrimack	7	6	6					
B 4548	WV 14-17 x Ac 26031	14	13	8		2	3		
B 4549	WV 14-17 x 96-28	8	8	7		1			
B 4550	WV 14-17 x B 606-3	8	8	4			4		
B 4552	WV 14-17 x B 3114-67	11	10	5			5		
B 4557	WV 14-17 x B 3944-11	5	4	2		2			
B 4570	Kennebec x A 117-52	23	19	3	1	11	3		1
B 4574	B 922-3 x B 3139-24	16	9	3	1	4	1		
B 4575	B 922-3 x 627-124	12	3	3					
B 4576	B 595-76 x Katahdin	8	6		1	4	1		
B 4579	B 3652-11 x B 3556-12	2	2			2			
B 4584	B 2067-52 x ND 457-1	13	4	2		2			
B 4592	Saco x B 400-1	2	2			2			
B 4594	B 24-78 x B 3309-8	15	14		1	4	4		
B 4595	B 56-11 x B 3139-24	13	5			2	3		
B 4596	B 595-76 x Menominee	1	1			1			
B 4598	B 929-6 x A 144-1	10	2				2		
B 4599	B 962-32 x B 2368-4	3	2			1	1		
B 4601	B 991-14 x Teton	33	20	3		8	6		2
B 4606	B 2368-4 x B 3131-8	8	4		1	2	1		
B 4608	B 3114-12 x B 2131-3	40	31	6	1	7	12	2	3
B 4609	B 3131-21 x B 2368-4	6	5				3	2	
B 4611	B 3418-15 x B 929-6	13	4			4			
B 4613	B 3309-8 x Katahdin	10	9			2	4	3	
B 4614	Mohawk x 96-56	4	4				2		2
B 4616	B 3139-24 x Katahdin	16	4			1	2		1
B 4617	792-88 x B 3139-24	6	2			1	1		
B 1547	X 96-56 X	4	4	3			1		
B 1548	B 606-3 X	4	3			3			
B 1550	B 1466-27 X	2	1	1					
B 1553	B 2098-5 X	2	1			1			
B 1556	B 3556-12 X	19	9	2		2	5		
B 1559	B 3945-12 X	4	1				1		
B 1560	WV 14-17 X	3	3	3					
B 2131-3	B 56-1 x B 594-46	1	1				1		
B 606-37	41956 x 96-56	1	1			1			
Ac 26031		1	1	1					
Ac 26033		1	1	1					
B 922-3	TI-5 x B 355-24	1	1		1				
B 922-6	TI-5 x B 355-24	1	1	1					
B 91-3	Sebago x (X 528-170)	1	1	1					
B 991-14	B 355-24 x B 81-40	1	1		1				
B 3097-82	Kennebec x B 991-13	1	1			1			
B 3139-24	B 607-56 x B 402-1	1	1				1		

Continued

Webb table 2 continued.

Pedigree	Parentage	Greenhouse		Relative resistance 7 days after infection in field					
		Tested	Susc.	Selection ratings ^{1/}					
		No.	selec.	1	2	3	4	5	6
B 3719-1	Ac 25953 x B 2331-5	1	1	1					
B 595-76	41956 x B 61-3	1	1			1			
B 2894-24	Kennebec x Teton	1	1			1			
B 3692-4	B 2919-1 x Ac 25953	1	1	1					
B 3725-1	Ac 25959 x 96-56	1	1	1					
Kennebec		1	1			1			
Merrimack		1	1				1		
Saco		1	1				1		

^{1/} See footnote 1, Webb table 1.

Resistance to virus A for 1959-60. Ninety-three selections were screened for resistance to virus A. Three plants of each selection were inarch-grafted with scions from virus A-infected plants of potato seedling 41956. Top-necrosis in grafted plants and subinoculating to the virus A indicator host were the criteria used in determining the susceptibility or resistance of the selections. Webb table 3 summarizes the results.

Webb table 3.--Summary of the test for resistance to virus A, 1959-60.

Pedigree	Parentage	Tested	Resistant	Susceptible
		No.	No.	No.
B 4446	B 595-76 x Katahdin	1		1
B 4461	B 3309-8 x "	2	1	1
B 4467	B 3307-4 x ND 457-1	1		1
B 4472	B 595-76 x B 3944-11	1		1
B 4473	B 606-3 x "	2	1	1
B 4475	B 606-37 x B 355-24	1		1
B 4476	" x B 3944-11	1	1	
B 4485	B 3097-82 x B 3139-24	1		1
B 4486	B 3114-67 x "	1	1	
B 4488	B 3139-24 x B 2067-52	1		1
B 4494	B 3397-17 x B 3944-11	3	2	1
B 4495	B 3428-26 x B 3139-24	1	1	
B 4499	B 3719-1 x B 3944-11	3	2	1
B 4503	B 3964-1 x "	3	2	1
B 4511	B 3707-4 x Menominee	1	1	
B 4512	B 3720-9 x Cayuga	1		1
B 4519	B 922-6 x B 3944-11	4	1	3
B 4520	B 595-76 x WV 11-17	1		1
B 4522	B 922-6 x B 3139-22	2	2	
B 4523	" x B 3944-11	5	3	2
B 4529	B 3428-20 x "	6	6	
B 4537	B 3692-4 x "	2	1	1
B 4543	B 3964-1 x B 355-24	1		1
B 4546	WV 11-17 x Menominee	2	1	1
B 4547	" x Merrimack	3	1	2
B 4548	" x Ac 26031	1	1	

Continued

Webb table 3 continued.

Pedigree	Parentage	Tested	Resistant	Susceptible
		No.	No.	No.
B 4552	WV 14-17 x B 3114-67	2	2	
B 4557	" x B 3944-11	1	1	
B 4563	A 163-28 x B 3099-5	1		1
B 4565	792-88 x A 180-15	1	1	
B 4570	Kennebec x A 117-52	1		1
B 4574	B 922-3 x B 3139-24	4	2	2
B 4579	B 3652-11 x B 3556-12	1		1
B 4580	B 3454-5 x B 3309-8	1	1	
B 4588	Houma x A 144-1	1		
B 4590	Pontiac x B 2368-4	5	3	2
B 4591	LaSoda x B 2368-4	3	1	2
B 4594	B 24-78 x B 3309-8	3	3	
B 4601	B 991-14 x Teton	1		1
B 4605	B 2368-4 x B 2997-9	1	1	
B 4606	" x B 3131-8	2	1	1
B 4611	B 3418-15 x B 926-6	1	1	
B 4613	B 3309-8 x Katahdin	1		1
B 4616	B 3139-34 x "	3	3	
B 4618	Sebago x 47156	1	1	
B 1545	Katahdin selfed	1		1
B 1549	B 1285-1 "	1	1	
B 1556	B 3556-12 "	1	1	
B 1558	B 3944-11 "	2	2	
B 1559	B 3945-12 "	1		1
B 1563	B 2331-5 "	1	1	
B 1564	B 2368-4 "	1	1	

Virus X Resistance. Eight hundred and eighty-one selections (Webb table 4) and 90 named varieties were screened for resistance to a virulent strain of virus X. One hundred and sixteen selections and varieties: Boone, Haig, Saco, Tama, and variety 43 were highly resistant to mechanical inoculation with the virus.

Webb table 4.--Summary of virus X resistance test, Aroostook Farm, Maine, 1959.

Pedigree	Parentage	Selections inoculated	Inf.	Not inf.
		No.	No.	No.
B 4448	B 902-2 x Saranac	12	11	1
B 4453	B 2098-5 x Menominee	8	8	
B 4454	" x B 2098-29	2	2	
B 4455	B 2331-5 x B 56-11	6	6	
B 4456	" x B 2131-3	12	11	1
B 4460	B 3195-3 x A 144-1	11	10	1
B 4461	B 3309-8 x Katahdin	26	16	10
B 4463	B 3427-7 x B 3418-10	7	4	3
B 4464	B 3443-6 x "	8	7	1
B 4467	B 3707 x ND 457-1	7	7	
B 4468	47156 x B 3139-24	4	4	
B 4469	" x B 3672-3	3	2	1
B 4472	B 595-76 x B 3944-11	4	4	
B 4458	B 3102-3 x B 355-24	5	3	2

Continued

Webb table 4 continued.

Pedigree	Parentage	Selections	Inf.	Not Inf.
		inoculated		
		No.	No.	No.
B 4473	B 606-3 x B 3944-11	6	4	2
B 4475	B 606-37 x B 355-24	15	10	5
B 4476	" x "	5	3	2
B 4480	B 1467-8 x B 3457-2	1	1	
B 4481	B 1467-9 x "	1	1	
B 4482	B 2067-52 x B 2067-23	9	8	1
B 4483	B 2331-5 x B 3139-24	5	5	
B 4485	B 3097-82 x B 3139-24	10	10	
B 4486	B 3114-67 x "	2	2	
B 4488	B 3139-24 x B 2067-52	7	7	
B 4489	B 3309-4 x B 3139-24	4	3	1
B 4494	B 3397-17 x B 3944-11	8	8	
B 4495	B 3428-20 x B 3139-24	12	7	5
B 4497	B 3427-7 x B 3457-2	2	1	1
B 4498	B 3457-2 x B 2813-30	2	2	
B 4499	B 3719-1 x B 3944-11	5	5	
B 4503	B 3964-1 x B 3944-11	5	5	
B 4507	B 926-9 x B 606-3	3	1	2
B 4508	B 3672-3 x Ac 26031	1	1	
B 4509	B 3907-4 x Earlane	9	9	
B 4511	B 3707-4 x Menominee	15	15	
B 4512	B 3720-9 x Cayuga	2	2	
B 4519	B 922-6 x B 3944-11	10	10	
B 4520	B 595-76 x WV 14-17	1		1
B 4521	B 606-37 x WV 14-17	1	1	
B 4522	B 922-6 x B 3139-24	11	11	
B 4523	B 922-6 x B 3944-11	10	10	
B 4529	B 3428-20 x B 3944-11	17	7	10
B 4531	B 3457-2 x WV 14-17	2	2	
B 4533	B 3556-12 x B 3692-4	5	1	4
B 4535	B 3556-12 x B 3944-11	5	3	2
B 4536	B 3692-4 x WV 14-17	1	1	
B 4537	B 3692-4 x B 3944-11	9	9	
B 4538	B 3718-WV 4 x B 3139-24	5	5	
B 4540	B 3719-1 x WV 14-17	2	2	
B 4543	B 3964-1 x B 355-24	2	2	
B 4544	41956 x B 606-3	2	2	
B 4546	WV 14-17 x Menominee	9	8	1
B 4547	WV 14-17 x Merrimack	7	7	
B 4548	WV 14-17 x Ac 26031	12	11	1
B 4549	WV 14-17 x 96-28	7	7	
B 4550	WV 14-17 x B 606-3	8	4	4
B 4552	WV 14-17 x B 3114-67	9	9	
B 4557	WV 14-17 x B 3944-11	5	5	
B 4560	X 792-88 x B 3099-5	3	2	1
B 4561	X 792-88 x A 124-62	5	4	1
B 4562	A 119-8 x B 3099-5	3	3	
B 4563	A 163-28 x B 3099-5	4	4	
B 4564	B 3099-5 x A 180-30	4	4	
B 4565	X 792-88 x A 180-15	7	6	1

Continued

Webb table 4 continued.

Pedigree	Parentage	Selections inoculated	Inf.	Not inf.
		No.	No.	No.
B 4566	A 163-13 x A 180-30	1	1	
B 4569	B 2759-5 x A 119-15	1	1	
B 4570	Kennebec x A 117-52	14	14	
B 4571	A 119-15 x B 595-76	2	2	
B 4572	Sequoia x A 124-62	10	10	
B 4574	B 922-3 x B 3139-24	14	14	
B 4575	B 922-3 x 627-124	9	7	2
B 4576	B 595-76 x Katahdin	8	3	5
B 4579	B 3652-11 x B 3556-12	2		2
B 4580	B 3454-5 x B 3309-8	3	3	
B 4587	B 606-37 x B 3299-13	3	2	1
B 4584	B 2067-52 x ND 457-1	10	8	2
B 4588	Houma x A 144-1	8	8	
B 4589	Katahdin x B 1383-5	1	1	
B 4590	Pontiac x B 2368-4	33	33	
B 4591	LaSoda x B 2368-4	19	19	
B 4592	Saco x B 400-1	1		1
B 4593	Triumph x B 2368-4	7	7	
B 4594	B 24-78 x B 3309-8	12	9	3
B 4595	B 56-11 x B 3139-24	12	12	
B 4596	B 595-76 x Menominee	1		1
B 4598	B 929-6 x A 144-1	8	7	1
B 4599	B 962-32 x B 2368-4	3	3	
B 4600	B 991-3 x B 2368-4	1	1	
B 4601	B 991-14 x Teton	29	27	2
B 4602	B 1268-26 x A 144-1	5	5	
B 4603	B 2331-5 x B 2997-9	1	1	
B 4604	B 2368-4 x B 2331-5	30	30	
B 4606	B 2368-4 x B 3131-8	6	3	3
B 4607	B 2997-9 x B 2331-5	6	6	
B 4608	B 3114-12 x B 2131-3	35	34	1
B 4609	B 3131-21 x B 2368-4	6	3	3
B 4610	B 3418-15 x Menominee	15	15	
B 4611	B 3418-15 x B 929-6	9	9	
B 4612	B 3418-15 x B 3418-10	5	5	
B 4613	B 3309-8 x Katahdin	10	9	1
B 4614	Mohawk x (X 96-56)	3	3	
B 4615	Mohawk x Menominee	1	1	
B 4616	B 3139-24 x Katahdin	15	15	
B 4617	792-88 x B 3139-24	2	2	
B 4618	Sebago x 47156	5	5	
B 1544	Earlaine selfed	2	2	
B 1545	Katahdin "	4	4	
B 1547	X 96-56 "	4	4	
B 1548	B 606-3 "	3	1	2
B 1549	B 1285 "	1	1	
B 1550	B 1466-27 "	1	1	
B 1551	B 2067-52 "	7	7	
B 1552	B 2067-23 "	2	2	

Continued

Webb table 4 continued.

Pedigree	Parentage	Selections	Inf.	Not inf.
		inoculated		
		No.	No.	No.
B 1553	B 2098-5 selfed	2	2	
B 1555	B 3457-2 "	1	1	
B 1556	B 3556-12 "	14	8	6
B 1558	B 3944-11 "	5	5	
B 1559	B 3945-12 "	4	1	3
B 1560	WV 14-17 "	2	2	
B 1561	A 124-62 "	1		1
B 1563	B 2331-1 "	3	3	
B 1564	B 2368-4 "	18	14	4
B 1565	B 936-12 "	3	1	2
B 24-78	Imperia x Earline	1	1	
B 2131-3	B 56-1 x B 594-76	1	1	
B 3099-5	Menominee x (X 157-9)	1	1	
B 3299-13	B 936-12 x Katahdin	1		1
B 606-37	41956 x 96-56	1		1
Ac 26031		1	1	
Ac 26033		1	1	
B 926-9	B 66-1 x (X 792-94)	1	1	
A 119-15		1	1	
B 922-3	TI 5 x B 355-24	1	1	
B 922-6	TI 5 x B 355-24	1	1	
B 936-12	792-94 x B 294-38	1		1
B 991-3	Sebago x (X 528-170)	1	1	
B 991-14	B 355-24 x B 81-40	1	1	
B 3097-82	Kennebec x B 991-13	1	1	
B 3139-24	B 607-56 x B 402-1	1	1	
B 3418-10	Menominee x B 881-12	1	1	
B 3719-1	Ac 25953 x B 2331-5	1	1	
B 1466-27	B 2067-2 selfed	1	1	
B 1467-8	B 2331-5 selfed	1	1	
B 595-76	41956 x B 61-3	1		1
B 2894-24	Kennebec x Teton	1	1	
B 3319-30	B 936-12 x Menominee	1		1
B 3453-2	B 2368-2 x B 2662-18	1	1	
B 3454-5	B 2368-2 x B 2368-17	1	1	
B 3692-4	B 2919-1 x Ac 25953	1	1	
B 3696-13	B 3097-16 x Ac 25959	1	1	
B 3725-1	Ac 25959 x 96-56	1	1	

Two plants of each clone were mechanically inoculated with a virulent strain of the X virus. Subinoculation from plants not showing necrosis were made to gomphrena for diagnosis of infection.

Virus Y. Three hundred and eighty-six new selections and 92 named varieties were included in the virus Y test for 1959 (Webb table 5). Of these 137 selections and varieties Calrose, Canoga, Canso, Canus, Essex, Golden, Norland, Onaway, and Red Beauty did not develop current season symptoms of infection. Parents B 2067-52, B 3139-24, ND 457, and B 3707-4 appear to be good sources of resistance to aphid infection with virus Y.

Webb table 5.--Summary of virus Y resistance, Arcostook Farm, Presque Isle, Maine, 1959.

Pedigree	Parentage	Selections			
		Tested	Diseased ¹	No symptoms	Diseased
		No.	No.	No.	Pct.
B 4461	B 3309-8 x Katahdin	32	32	0	100
B 4463	B 3477-7 x B 3418-10	9	9	0	100
B 4464	B 3443-6 x B 3418-10	9	9	0	100
B 4467	B 3707-4 x ND 457-1	7	6	1	86
B 4468	47156 x B 3139-24	4	4	0	100
B 4483	B 2331-5 x B 3139-24	5	4	1	80
B 4484	B 2331-5 x B 3309-8	2	2	0	100
B 4485	B 3097-82 x B 3139-24	11	6	5	54
B 4486	B 3114-67 x B 3139-24	2	1	1	50
B 4488	B 3139-24 x B 2067-52	5	5	0	100
B 4495	B 3309-4 x B 3139-24	13	12	1	92
B 4497	B 3397-17 x B 3944-11	2	2	0	100
B 4498	B 3457-2 x B 3813-30	2	2	0	100
B 4499	B 3719-1 x B 3944-11	6	5	1	83
B 4503	B 3964-1 x B 3944-11	8	8	0	100
B 4507	B 926-9 x B 606-3	3	3	0	100
B 4508	B 3672-3 x Ac 26031	1	1	0	100
B 4512	B 3720-9 x Cayuga	3	3	0	100
B 4519	B 922-6 x B 3944-11	12	12	0	100
B 4520	B 595-76 x WV 14-17	1	0	1	0
B 4521	B 606-37 x WV 14-17	1	1	0	100
B 4522	B 922-6 x B 3139-24	13	13	0	100
B 4523	B 922-6 x B 3944-11	11	11	0	100
B 4531	B 3457-2 x WV 14-17	2	2	0	100
B 4533	B 3556-12 x B 3692-4	7	6	1	86
B 4537	B 3692-4 x B 3944-11	12	12	0	100
B 4538	B 3718-WV 4 x B 3139-24	6	6	0	100
B 4540	B 3719-1 x WV 14-17	4	3	1	75
B 4546	WV 14-17 x Menominee	10	9	1	90
B 4547	WV 14-17 x Merrimack	7	6	1	86
B 4552	WV 14-17 x B 3114-67	11	10	1	91
B 4575	B 922-3 x 627-124	12	8	4	66
B 4576	B 595-76 x Katahdin	8	8	0	100
B 4579	B 3652-11 x B 3556-12	2	2	0	100
B 4580	B 3454-5 x B 3309-8	3	3	0	100
B 4584	B 2067-52 x ND 457-1	13	7	6	54
B 4587	B 606-37 x B 3299-13	4	2	2	50
B 4594	B 24-78 x B 3309-8	15	14	1	94
B 4595	B 56-11 x B 3139-24	13	13	0	100
B 4596	B 595-76 x Menominee	1	1	0	100
B 4609	B 3131-21 x B 2368-4	6	6	0	100
B 4613	B 3309-8 x Katahdin	10	10	0	100
B 4614	Mohawk x 96-56	4	3	1	75
B 4615	Mohawk x Menominee	1	1	0	100
B 4616	B 3139-24 x Katahdin	17	16	1	94
B 4617	792-88 x B 3139-24	6	6	0	100
B 4618	Sebago x 47156	6	5	1	83
B 1549	B 1285-1 x	1	1	0	100
B 1550	B 1466-27 x	2	1	1	50

Continued

Webb table 5 continued.

Pedigree	Parentage	Selections			
		Tested	Diseased ^{1/}	No symptoms	Diseased
		No.	No.	No.	Pct.
B 1551	B 2067-52 x	7	5	2	72
B 1552	B 2068-23 x	2	2	0	100
B 1553	B 2098-5 x	2	2	0	100
B 1555	B 3457-2 x	1	1	0	100

Seedling and variety reaction to virus Y:

Diseased				No symptoms
B24-78	Cherokee	La Salle	Red McClure	B3299-13
B2947-9	Chippewa	LaSoda	Red Pontiac	B926-9
B400-1	Chisago	Manota	Red Warba	B922-3
B2131-1	Cal. Russet	Marygold	Rukat	B936-12
B606-37	Dazoc	Menominee	Rur. New Yorker	B91-3
Ac 26031	Delus	Merrimack	Rushmore	B991-14
Ac 26033	De Sota	Mesaba	Rus. Sebago	B3139-24
B922-6	Earlaine	Mohawk	Russet Rural	B3418-10
B3097-82	Earlaine 2	Norkota	Saco	B1467-8
B3719-1	Early Gem	Nordak	Saranac	Calrose
B1466-27	Erie	Norgleam	Satapa	Canoga
B595-76	Excel	Ontario	Sebago	Canso
B2894-24	Garnet Chili	Osage	Seneca	Canus
B3140-36	Green Mountain	Osseo	Sequoia	Essex
B3319-30	Haig	Pawnee	Sheridan	Golden
B3453-2	Harford	Plymouth	Spaulding Rose	Norland
B3454-5	Harmony Beauty	Pontiac	Tawa	Onaway
B3692-4	Houma	Progress	Teton	Red Beauty
B3696-13	Heinkul	Pungo	Triumph	
B3725-1	Irish Cobbler	Redbake	Warba	
American Giant	Kasota	Redburt	White Cloud	
Antigo	Katahdin	Redglo	White Rose	
Boone	Kennebec	Redkote	Wisconsin Pride	
Rus. Burbank	Keswick	Red LaSoda	Variety 43	
Cayuga	Knik	Potomac	Yampa	
			NY 1122	

^{1/} Diseased if one or more plants of a 3-hill row were infected.

FURTHER EVALUATIONS OF SOLANUM SPECIES AND
SPECIES HYBRIDS FOR RESISTANCE TO DISEASE

R. E. Webb and E. S. Schultz

Preliminary evaluations of Solanum species and species hybrids for resistance to disease indicated that many of the selections contained in the Sturgeon Bay Collection possessed resistance to some potato diseases of economic importance. Continued tests were deemed necessary to determine the nature of resistance to disease inherent in these selections. Tubers of selections with apparent resistance to one or more virus diseases were obtained for additional plant inoculation tests. In addition, a number of foreign varieties were included in several tests for resistance to disease under field conditions. Preliminary evaluations of some haploids of S. tuberosum for resistance to viruses A, X, and Y are included in this report.

Materials and Methods

Selections of the Solanum species and species hybrids except those in tables 1 and 2 were evaluated for resistance to disease during the winter months at Beltsville, Maryland. Tests under field conditions were conducted on Aroostook Farm, Presque Isle, Maine.

Table 1.--Reaction of foreign varieties and Solanum introductions to certain viruses and fungi, Aroostook Farm, Maine, 1958.

Variety or introduction	Virus Y ¹ /	Leaf- roll ² /	Spindle tuber ³ /	Late blight ⁴ /	Verticillium wilt ⁵ /	Scab ⁶ /
Aquila	S	S	S	R **	0/10	3/3
Bell de Fonteney	S	S	S	S	3/10	1/3
Bevelander	S **	S	S	R **	0/10	2/2
Bintje	S	S	S	S	4/10	3/4
Centifolia	S **	S	S	R **	0/10	2/1
Eersteling	S *	S	S	S	3/10	4/2
Eigenheimer	S **	S	S	R *	5/10	4/4
Elsa	S	S	S	R *	3/10	4/2
Erdgold	S	S	S	S	6/10	T/2
Eva	S **	S	S	R *	1/10	4/3
Falke	S	S		R **	1/10	1/1
Flava	S	S	S	R *	2/10	4/3
Fruhmolle	S **	S	S	R *	6/10	4/3
Furore	S	S	S	R **	2/10	3/4
Geelblom	S *	S	S	S	6/10	4/3
Gladstone	S	S	S	R *	3/10	3/1
Great Scot	S	S	S	S	0/10	3/1
Heida	S	S	S	R **	4/10	T/1
Jacobi	S **	S	S	R *	0/10	1/1
Kerr's Pink	S **	S	S	R *	0/10	4/2
Limosa	S	S	S	S	2/10	1/2
Majestic	R	S	S	S	2/10	3/3
Maritta	S *	S	S	R **	2/10	T/1
Monak	S	S	S	R **	0/10	T/1
Moona	S *	S	S	R **	2/10	2/2
Oberarnbacker Fruhe	S **	S	S	S	1/10	1/2

Continued

Table 1 continued.

Variety or introduction	Virus Y ¹ /	Leaf-roll ² /	Spindle tuber ³ /	Late blight ⁴ /	Verticillium wilt ⁵ /	Scab ⁶ /
Olympia	S *	S	S	R **	1/10	T/1
Ostbote	S	S	S	R **	1/10	1/1
Panther	S **	S	S	R *	1/10	2/1
Pentland Ace	R	S	S	R	2/10	4/3
Populair	S *	S	S	R **	1/10	4/3
President	S	S	S	R *	2/10	2/1
Primula	S	S	S	S	4/10	3/3
Record	S	S	S	R *	5/10	3/2
Rheingold	S *	S	S	R **	0/10	3/3
Saskia	S **	S	S	S	4/10	4/3
Tebon	S	S	S	S	0/10	4/3
Urgenta	R	S	S	R *	0/10	4/4
Urtica	S	S	S	R **	0/10	1/1
Vera	S	S	S	S	10/10	2/3
Victor	S **	S	S	R **	4/10	3/3
Voran	S **	S	S	R *	2/10	1/1
Ysselster	S	S	S	R *	4/10	2/1
Zaldi	S	S	S	R *	3/10	1/2
Katahdin	S *	S	S	S	2/10	3/3
Kennebec	S *	S	S	R *	5/10	3/3

- 1/ Inoculated with viruliferous Myzus persicae in the field just after plants were up to a stand. Read 7 weeks after inoculation. R = 0/3 plants developing symptoms; S = 1 or more plants developing current season symptoms; * = 1/3 plants infected; ** = 2/3 plants infected.
- 2/ Planted in 5-hill plots. Inoculated with viruliferous Myzus persicae carrying strain 3, June 27, 1958. Read August 28. Each plant in each plot developed symptoms.
- 3/ Inoculated 7/21/58 by the brush method using 41956 as the source of inoculum. Read 8/29/58.
- 4/ Evaluations recorded 21 days after plant infection. S = no field resistance, R ** = 1/3 - 1/2 of foliage showing lesions, R * = 1/2 - 3/4 foliage showing lesions.
- 5/ Final readings made 9/2/58. Numerator = number of plants infected, denominator = total number of plants.
- 6/ Numerator = area covered, denominator = lesion type, (5/5 = 100% area covered, deep pustule type).

Table 2.--Reaction of late blight differentials planted in the late blight resistance plot, Aroostook Farm, Presque Isle, Maine, 1958.

PI Number	Pedigree	Genotype	Reaction ¹ / Dates				
			8/5	8/17	8/27	9/6	9/15
201401	SSRPB 835a (4)	R ₁	2	4	5	5	5
203904	CB 43154-5	R ₁	3	4	5	5	5
201402	SSRPB 1512c (16)	R ₂	1	3	5	5	5
203905	CB 44158-4	R ₂	0	1	2	5	5
	922-3	R ₂	0	1	3	5	5
201403	SSRPB 1553a (12)	R ₃	0	0	1	3	5
203902	CB 4737-33	R ₃	0	2	3	5	5
201404	SSRPB 1563c (14)	R ₄	4	5	5	5	5

Continued

Table 2 continued.

PI Number	Pedigree	Genotype	Reaction dates ^{1/}				
			8/5	8/17	8/27	9/6	9/15
203900	CB 4431-5	R ₁	3	4	4	5	5
	D x D-3	R ₁	3	4	5	5	5
	DRF	R ₁ R ₁	0	1	2	5	5
201405	SSRPB 1647b (1)	R ₁ R ₂	0	0	2	5	5
203901	CB 4651-2	R ₁ R ₂	0	0	1	3	5
	3 x E-1	R ₁ R ₂	0	0	1	5	5
	922-5	R ₁ R ₂	0	1	2	4	5
203903	CB 4739-58	R ₁ R ₃	0	4	5	5	5
201406	SSRPB 1506b (9)	R ₁ R ₄	1	2	3	5	5
203906	CB 46147-30	R ₁ R ₄	1	3	4	5	5
	3 VM-19	R ₁ R ₄	4	5	5	5	5
	3 RH-2	R ₂ R ₂	4	5	5	5	5
201407	SSRPB 1682c (1)	R ₂ R ₃	0	0	0	0	0
215619	" 2070 (31)	R ₂ R ₄	0	1	2	4	4
203899	CB 4414-2	R ₂ R ₄	0	1	3	5	5
	TI 5	R ₂ R ₄	0	0	1	3	5
	922-12	R ₂ R ₄	0	0	1	4	5
	3 xx 4	R ₂ R ₄	0	0	1	4	5
201408	SSRPB 1488b (1)	R ₃ R ₄	0	0	0	1	2
215622	" 2070 (64)	R ₁ R ₂ R ₃	0	0	0	0	0
215623	" " (69)	R ₁ R ₂ R ₄	0	0	1	3	3
	3 xx-1	R ₁ R ₂ R ₄	0	1	3	4	5
	922-6	R ₁ R ₂ R ₄	0	1	2	5	5
	922-18	R ₁ R ₂ R ₄	0	1	2	5	5
215621	SSRPB 2070 (51)	R ₁ R ₃ R ₄	0	0	0	0	0
215620	" " (50)	R ₂ R ₃ R ₄	0	0	0	0	0
215618	" " (30)	R ₁ R ₂ R ₃ R ₄	0	0	0	0	0
Green Mountain			5	5	5	5	5
Kennebec			3	5	5	5	5

^{1/} Reaction rating: 0 = No lesions, 1 = occasional lesion over plant, 2 = 1/3-1/2 leaves showing lesions, 3 = 1/2-3/4 leaves showing lesions, 4 = All but few leaves showing lesions, 5 = plants dead.

In the greenhouse tests, each selection was evaluated for resistance to virus infection by mechanical inoculation and inarch grafting in groups of 5 and 3 plants respectively. In the field, aphids (*Myzus persicae* Sulz.) were used to inoculate the plants with virus Y and leafroll. Inoculation with the spindle tuber virus was done by hand switching 5 plants of each selection with tops of diseased plants. Tests for resistance to *Verticillium* wilt and scab were conducted in soil infested with the organisms. Foreign varieties and the species hybrids evaluated for resistance to late blight were planted in duplicate or triplicate (3- to 5-hill lots each) in the late blight plot conducted annually for this purpose. Race "O" of the organism was inoculated the first 2 weeks of July to plants of Green Mountain planted in each third row throughout the plot.

Plant symptoms and/or subinoculating from inoculated plants to the appropriate indicator host was used as criteria for evaluating susceptibility or resistance to virus infection in the greenhouse. *Solanum demissum* L. PI 175404, *Gomphrena globosa* L. and *Datura stramonium* L., and *Nicotiana tabacum* L. var Samson were used as diagnostic hosts for viruses A, X, and Y respectively. Criteria for evaluating relative resistance to late blight and scab are given in tables 1 and 2.

Resistance to viruses A and X in *S. tuberosum* L. (andigena). Preliminary tests in 1957 and 1958 indicated that some plant introductions of *S. tuberosum* (andigena) were highly resistant to mechanical inoculation with either viruses A or X. Some selections of this group were evaluated by mechanical means for resistance to viruses A, X, and Y. Selections that failed to become diseased or appeared not to be infected upon subinoculating to an indicator host were re-inoculated by the inarch graft technique. Approximately 40 days after grafting, the selections were indexed on the appropriate indicator host. Fifteen selections were resistant to mechanical inoculation, but susceptible to graft inoculation with potato virus A. Twenty-eight selections were highly resistant to graft inoculation with this virus. Eight selections were resistant to mechanical inoculation with virus X but were susceptible to graft inoculation and 13 selections were resistant to graft inoculation. Five selections were highly resistant to graft inoculation with both viruses A and X. All 86 selections were susceptible to infection with potato virus Y.

Resistance to graft inoculation with virus X in *Solanum* species and species hybrids. In addition to the selections of *S. tuberosum* (andigena), selections of *S. acaule*, *S. maglia*, *S. sucrense*, an unidentified selection, and 2 species hybrids that had been screened by mechanical inoculation were graft-inoculated with a virulent strain of virus X. Selections of *S. acaule*, 5 of *S. tuberosum* (andigena) and 1 species hybrid failed to react to inoculation. All other selections developed either slight to moderate necrotic spotting in the young leaves or necrosis in the growing points. This necrosis was much more extensive than that shown by graft-inoculated plants of the X-immune 41956. Subinoculation from each selection to indicator hosts *G. globosa* and *D. stramonium* indicated that the virus was present in some selections (table 2). Indexing plants of *G. globosa* that showed symptoms developed only one to 5 local lesions over the 4 - 6 inoculated leaves. In all cases where *G. globosa* detected virus X upon subinoculation, *D. stramonium* also developed symptoms. Apparently the virus concentration was so low in some selections as to be undetectable on *G. globosa* but produced infection in *D. stramonium*.

Resistance to virus Y in *Solanum* species and species hybrids. Twenty-four selections of 6 species and 8 species hybrids that had proven resistant to Virus Y by mechanical means were graft-inoculated with the virus. Virus Y was not recovered from selections of *S. chacoense*, *S. demissum*, *S. hougasii*, *S. jamesii*, and *S. stoloniferum*.

Multiple resistance to virus diseases in *Solanum* species and species hybrids. Five selections of *S. tuberosum* (andigena), 1 of *S. maglia* and 2 species hybrids were highly resistant to both viruses A and X. Two selections of *S. chacoense*, 2 of *S. hougasii*, 3 of *S. stoloniferum* and 1 species hybrid were highly resistant to viruses A and Y.

Resistance to disease of some foreign potato varieties. Forty-four foreign potato varieties were screened for resistance to virus Y and leafroll, spindle tuber, late blight, *Verticillium* wilt and scab under field conditions in 1958. The test for late blight resistance was conducted in 1959 and the results were essentially the same as 1958. Seven varieties were equally as resistant to virus Y as Katahdin and Kennebec. Varieties Majestic, Pentland Ace, and Urgenta appear to be highly field resistant to this virus. All varieties were susceptible to leafroll and spindle tuber. Thirty-one of the

44 varieties possessed some field resistance to late blight. Of these, 14 were highly resistant to infection in the field and 1 variety, Pentland Ace, failed to become diseased.

One or more selections of each of the late blight differential hosts used for late blight race identification were planted in triplicate in the late blight plot in 1958 and 1959. These selections were planted to detect the natural occurrence of the different races of the organism evolving in the late blight plot, the pattern of their appearance and the relative field resistance of the different selections of similar genotype. Table 2 summarizes the results for 1958. The results of the 1959 test were essentially the same as that of 1958. Ten races were detected in 1958 and 8 in 1959. Race 4 appeared simultaneously with the appearance of infection with race "0", 8 to 10 days after the initial inoculation. Races 1 and 1, 4 were detected about 2 weeks after the initial inoculation, followed by races 2; 3; 1, 2; 1, 3; 2, 4; 1, 2, 4; and 3, 4. Races 1, 3, 4 and 1, 2, 3, 4, though not appearing on the indicator plants, were identified by collecting infected leaves at random from the plot and inoculating the spore suspensions to detached leaves of the differentials.

A number of the differentials of similar genotype, particularly those with genotypes R2; R4; R1, 4; and R1, 2, 4 showed considerable differences in field resistance to late blight.

INTER-REGIONAL POTATO INTRODUCTION PROJECT
(Cooperative State-Federal Project)

R. W. Hougas and R. W. Ross

Ninety-nine new stocks were received in 1959. These stocks were obtained following requests to foreign laboratories and through Solanum expeditions to Mexico and South America (expedition led by Dr. D. S. Correll of the Texas Research Foundation, Renner, Texas) as well as clonal stocks from the 1958 expedition in Mexico and Central America (led by Dr. J. G. Hawkes, University of Birmingham, England).

The usefulness of screenhouses for true seed increase of Solanum stocks has been previously reported. Satisfactory tuber increase of some introductions (i.e. those with long-day requirement) was also obtained in the screenhouses during the past year.

Shipments of seeds and tubers were made during the past year to 18 States and 13 foreign countries. Total shipments included 406 seed samples and 1,459 tuber samples.

Dr. D. S. Correll of the Texas Research Foundation spent a week in late August, 1959 at the Potato Introduction Station collecting plant specimens from the field and studying prepared herbarium mounts. Dr. Correll is presently in South America continuing his explorations for Solanum species. After completion of these explorations Dr. Correll plans to publish his expeditions and his taxonomic studies of the tuber-bearing Solanum.

The evaluation and use of the Solanum species continues to show accelerated progress as a result of the work of the cooperative project between the Vegetable and Ornamentals Research Branch of USDA and the Wisconsin Agricultural Experiment Station. The principal areas of investigation of this cooperative project are pathology and cytogenetics.

The first objective of the pathology program has been to screen the stocks of the Collection for their reaction to major diseases of the potato. The initial published report of this work, covering the screening of 200 selections of 39 Solanum species and 58 species hybrids for their reaction to virus A, virus X, virus Y, leaf roll virus, spindle tuber virus and Verticillium appear in the Plant Disease Reporter 43:144-151, February 15, 1959. The results of more recent investigations will be summarized in the reports of individual workers.

The primary objective of the genetic and cytogenetic program is to provide basic information, techniques and hybrids that will be useful to potato breeders of the nation in developing improved commercial varieties. The program is currently placing emphasis upon problems related to gene transfer from the numerous wild and cultivated tuber-bearing Solanum species to the common potato. Progress in this work will be covered in the reports of individual workers.

GENETICS AND CYTOGENETICS OF THE TUBER-BEARING SOLANUM SPECIES
(Cooperative ARS, USDA and Wisconsin Station)

R. W. Hougas and S. J. Peloquin

Studies concerned with haploidy in the common potato were again emphasized in 1959. Two hundred sixty-three additional haploids were obtained through methods previously described (Jour. Heredity 49:103-107). Haploids have been isolated to date from the following varieties and breeding selections: Cayuga, Cherokee, Chippewa, Early Gem, Irish Cobbler, Katahdin, Kennebec, Merrimack, Osseo, Red Pontiac, Red Warba, Russet Rural, Sebago, Tawa, B 3139-24, Ia 1111-8, Minn 10-5-12, Minn 15-2-10-1-2, Minn 20-20-34, Minn 44-2, Minn 113-1, ND 457-1, Wis X-137, Wis X-143, and USDA X-927-3. Haploids were also isolated from the subspecies andigena (P.I.'s 186180, 193669, 205623, 230457, 234585, 243382, and 243453).

One hundred ninety-eight F₁ families from matings of S. tuberosum haploids and 23 diploid species (species noted in 1958 report) were grown. Most of the F₁ plants were very vigorous. Striking hybrid vigor, as measured by tuber yield, was found in certain of these progenies.

The choice of both the S. tuberosum parent and the "pollinator" has a significant effect on the frequency of haploids. The data presented in Table 1 indicate the variation in haploid frequency dependent on the female parent. The differences, expressed in terms of haploids per 100 pollinations and haploids per 100 seeds were marked. The commercial variety Merrimack was particularly outstanding as a source of haploids.

Hougas table 1. Frequency of haploids from varieties when S. Phureja P. I. 225682.1 was used as the "pollinator".

Female parent	Flowers pollinated	Fruit	Seeds	Haploids	Haploids per 100 pollinations	Haploids per 100 seeds
Cherokee	154	24	206	2	1.3	1.0
Chippewa	285	52	651	7	2.5	1.1
Irish Cobbler	297	77	2002	0	0.0	0.0
Early Gem	329	38	320	1	0.3	0.3
Katahdin	486	116	306	7	1.5	2.3
Merrimack	520	230	1992	93	17.9	4.7
Osseo	616	193	2268	1	0.2	<0.1
Red Pontiac	356	141	411	2	0.6	0.5
Red Warba	197	112	2009	0	0.0	0.0
Sebago	234	49	118	2	0.9	1.7
Tawa	521	200	1452	28	5.4	1.9

An unexpected, but significant finding was the effect of the "pollinator" on the frequency of haploids. The results of crosses between the variety Merrimack and 10 "pollinators" are summarized in table 2. The selection 1.1, an S. phureja introduction (P.I. 225682.1) from Colombia, South America, was the most effective "pollinator."

Hougas table 2. Effect of the pollinator on the frequency of haploids obtained from S. Tuberosum var. Merrimack.

"Pollinator"*	Flowers pollinated	Fruit	Seeds	Haploids	Haploids per 100 pollinations	Haploids per 100 seeds
1	544	331	575	3	0.6	0.5
1.1	520	230	1992	93	17.9	4.7
1.2	1027	626	677	2	0.2	0.3
2.3	683	340	420	3	0.4	0.7
2.4	819	561	989	10	1.2	1.0
3.2	224	90	104	5	2.2	4.8
7.4	306	81	135	1	0.3	0.7
11.2	194	89	174	2	1.0	1.2
12.2	275	88	144	0	0.0	0.0
14.5	153	105	86	0	0.0	0.0

*Selections of S. phureja

The decapitation technique has proven to be an efficient and effective tool in the search for Solanum haploids, (European Pot. Jour. 2:176-183). It has several important advantages which include; (1) a significant increase of fruit and seeds-per-pollination as compared to field pollinations, (2) adaptability to large-scale operation, and (3) the flexibility to conduct experiments under various controlled environments.

Meiosis has been studied in the F_1 hybrids between haploids ($2n=24$) of S. tuberosum and 8 of the diploid ($2n=24$) tuber-bearing Solanum species. The species represented 5 taxonomic series. Meiosis was highly regular in all hybrids examined. Twelve bivalents were present at diakinesis in over 80 percent of the microsporocytes and pachytene pairing was normal.

NORTH CENTRAL REGIONAL TRIALS 1959

August E. Kehr and Cooperators^{1/}

The North Central Regional Trials were first established in their present form in 1950. This year marks the completion of the 9th season. These trials have been enthusiastically supported by the cooperators in the North Central States, and they have become an important segment of the potato improvement work in the region. The work is done in cooperation with the USDA and is part of the over-all National Potato Improvement Program.

From the 1958 trials one selection has been named and released as follows:

<u>Progeny No.</u>	<u>Release Name</u>	<u>Introduced by</u>	<u>Parents</u>
Neb 156.48-2x	Bounty	Nebraska	Pontiac x Neb 117.43-3

Environmental Conditions: The tests were conducted on peat soils in Indiana and Iowa and on mineral soils in the other States. Fertilizer applications, spray programs, and planting distances are based upon local conditions, practices and soil requirements.

Planting dates varied from March 25 in Kansas to June 13 in Nebraska. Days to harvest are as follows:

	<u>Date Planted</u>	<u>Date Harvested</u>	<u>Total days to Harvest</u>
Indiana	May 8	October 8	153
Iowa	April 18	September 11	146
Kansas	March 25	July 30	127
Louisiana	-	-	-
Michigan	May 19	September 22	157
Minnesota	May 13	September 25	135
Missouri	March 31	July 25	117
Nebraska	June 13	October 5	144
North Dakota	May 12	September 14	125
Ohio	June 11	October 20	131
Wisconsin	May 30	October 1	123

Rainfall was above normal in Iowa, Minnesota, North Dakota and Wisconsin, but was limiting in Indiana, Kansas, Missouri, and (with exception of June) in Nebraska. The last three locations applied irrigation water as required. Temperatures tended to be above normal at most locations during the summer months with the exception of Nebraska where temperatures were below normal for July and August.

^{1/} Indiana, K. W. Johnson; Iowa, Lind Sanford; Kansas, J. K. Greig; Louisiana, J. C. Miller; Michigan, N. R. Thompson; Minnesota, O. C. Turnquist; Missouri; V. N. Lambeth; Nebraska, Robert O'Keefe; North Dakota, R. H. Johanson; Ohio, W. N. Brown; Wisconsin, G. H. Rieman, USDA, A. E. Schark

Yields: In the early group no entry significantly yielded more than the Triumph check, though Wis Ag 29 and Wis Ag 59 averaged higher in yields than any other entries. Similarly the Pontiac check outyielded all entries in the late group. Bounty and La 42-45 followed Pontiac as the next highest in the late group. Bounty yielded about 500 bushels per acre in 1959 as compared to 552 bushels in 1958. This variety has been quite outstanding for yielding ability at most locations over a 2-year period.

Maturity: The earliest maturing selections at all locations were: Wis Ag 59, ND 4122-2, ND 3324-2, and ND 3631-6 R, all of which were about Cobbler maturity. Some selections classified by their developers as early (and placed in the early group) were almost as late as Pontiac. Latest maturity among the entries was B 2368-4.

Percentage Solids: For the fourth consecutive year, location had a greater effect on solids than varieties as indicated by the following:

	<u>Highest</u>	<u>Lowest</u>	<u>Difference</u>
Range of selections	18.91	16.15	2.76
Range of locations	20.95	15.42	5.53

Three selections were not planted at all locations and were not included in any of the above calculations.

Selections with the highest average total solids were Neb 114.49-1x [(20.06) not planted in Indiana], B 73-3, Wis Ag 29, and Wis Ag 56. All four averaged higher than Cobbler.

Scab Resistance: Least amount of scab was found on Wis Ag 29, Neb 114.49-1x, La 42-45, Wis Ag 56, and ND 4122-2. Scab was very severe in Minnesota and very mild in Michigan.

Overall Merit Ratings: Merit ratings given entries are as follows:

ND 3324-2	28	ND 4122-2	14
Wis Ag 59	27	Wis Ag 56	12
Wis Ag 29	22	La 42-45	10
Bounty	18	B 2368-4	8

North Central Table 1. Yields of U. S. No. 1

	Ind. Cwt.	Iowa Cwt.	Kansas Cwt.	Mich. Cwt.	Minn. Cwt.	Mo. Cwt.	Nebr. Cwt.	N.D. Cwt.	Ohio Cwt.	Wis. Cwt.	Ave. Cwt.
<u>Early</u>											
Neb. 45-51-3	-	414.7	228.8	144.1	309.7	273.9	207.3	156.8	113.0	382.1	247.8
Neb. 114,49-1x	-	357.8	223.0	129.2	236.5	166.2	159.1	101.8	78.9	272.9	191.7
N.D. 3324-2	373.5	385.1	281.1	110.0	264.0	226.4	137.1	189.5	148.3	294.4	240.9
N.D. 3631-6R	245.7	345.6	227.0	177.1	309.3	130.2	164.4	125.2	167.3	270.0	216.2
N.D. 4122-2	315.4	285.2	323.5	85.3	288.4	254.1	147.5	137.2	125.6	274.1	223.6
Wis Ag 29	427.5	444.3	268.9	177.5	375.1	290.1	94.7	167.7	157.8	318.3	272.2
Wis Ag 56	453.0	478.0	242.2	199.6	290.5	292.8	127.1	172.1	154.7	339.8	275.0
Wis Ag 59	279.9	356.6	159.1	178.6	247.0	284.9	54.0	102.9	131.3	336.8	213.1
Triumph	358.9	433.9	321.8	191.7	300.0	290.1	169.6	179.1	126.9	351.4	272.3
Cobbler	336.9	353.2	275.3	124.9	275.3	253.0	162.6	175.3	171.7	220.7	234.9
<u>Late</u>											
Bounty	-	566.9	374.0	193.8	369.8	303.2	208.5	196.6	124.4	390.9	312.2
B 73-3	176.6	299.1	152.8	147.8	270.9	-	140.0	77.9	107.3	245.7	179.8
B 2368-4	454.8	326.4	274.1	163.4	443.9	-	176.0	194.9	221.6	376.4	292.4
La 42-45	455.3	487.3	281.7	210.2	356.3	-	199.8	157.9	-	336.8	310.6
La 91-78	316.5	345.0	230.0	139.0	269.6	-	171.3	148.6	-	299.1	239.8
Red Pontiac	591.3	483.2	386.2	248.3	367.6	389.5	221.3	208.0	311.2	371.8	357.9

North Central Table 2. Maturity classification

	<u>Ind.</u>	<u>Iowa</u>	<u>Kan.</u>	<u>Mich.</u>	<u>Minn.</u>	<u>Mo.</u>	<u>Nebr.</u>	<u>N.D.</u>	<u>Ohio</u>	<u>Wis.</u>	<u>Ave.</u>
<u>Early</u>											
Neb. 45.51-3	-	2.4	3.5	3.0	-	2.5	3.0	2.5	2.7	2.5	2.76
Neb.114.49-1x	-	3.4	4.5	3.0	-	3.5	3.0	3.0	3.8	4.4	3.58
N.D. 3324-2	2.0	1.6	2.5	3.0	-	1.5	3.0	2.0	2.1	2.1	2.20
N.D. 3631-6R	2.0	2.1	2.0	3.0	-	1.5	3.0	2.0	2.6	2.0	2.24
N.D. 4122-2	2.0	1.7	3.0	2.8	-	2.0	2.0	3.0	2.1	1.0	2.18
Wis Ag 29	2.0	2.0	3.3	3.0	-	2.5	3.0	2.5	2.2	2.1	2.51
Wis Ag 56	3.0	3.0	5.0	3.3	-	3.5	3.0	3.8	3.7	3.4	3.52
Wis Ag 59	2.0	2.0	1.3	3.0	-	2.0	2.0	2.0	2.0	1.5	1.98
Triumph	2.0	2.6	3.5	2.5	-	2.5	2.0	2.0	2.4	2.5	2.44
Cobbler	2.0	1.6	2.0	2.8	-	2.5	2.0	2.0	2.5	1.1	2.06
<u>Late</u>											
Bounty	-	2.0	4.5	3.0	-	3.0	3.0	3.0	2.7	4.4	3.20
B 73-3	2.0	3.2	4.5	3.0	-	4.0	4.0	2.0	3.4	2.8	3.21
B 2368-4	4.0	4.0	5.0	3.0	-	3.5	3.0	4.0	3.9	3.5	3.77
La 42-45	3.0	3.1	4.3	2.3	-	2.5	3.0	3.0	-	3.8	3.13
La 91-78	2.0	2.4	3.0	2.0	-	3.0	2.0	2.3	-	2.4	2.39
Red Pontiac	3.0	4.0	5.0	3.0	-	3.5	4.0	3.0	4.5	4.4	3.82

North Central Table 3. Total Solids

	<u>Ind.</u>	<u>Iowa</u>	<u>Kan.</u>	<u>Mich.</u>	<u>Minn.</u>	<u>Mo.</u>	<u>Nebr.</u>	<u>N.D.</u>	<u>Ohio</u>	<u>Wis.</u>	<u>Ave.</u>
<u>Early</u>											
Neb. 45.51-3	-	14.8	15.8	16.5	16.9	17.5	19.2	18.6	15.6	17.3	16.91
Neb.114.49-1x	-	17.7	18.4	19.2	21.2	18.8	22.0	23.1	19.7	20.4	20.06
N.D. 3324-2	15.6	16.0	16.7	17.7	19.4	18.6	20.1	21.2	16.2	18.7	18.02
N.D. 3631-6R	14.3	16.0	15.4	16.7	18.6	18.0	18.4	19.0	15.8	18.0	17.02
N.D. 4122-2	14.5	15.0	17.5	17.3	20.1	18.6	20.5	21.6	15.4	18.3	17.88
Wis Ag 29	15.6	16.0	18.0	17.5	21.4	18.2	19.2	22.4	16.5	19.9	18.47
Wis Ag 56	16.5	16.2	18.6	18.6	19.2	18.2	19.9	21.6	18.2	19.6	18.66
Wis Ag 59	15.0	16.7	17.3	17.3	20.3	18.6	20.5	21.4	16.2	18.2	18.15
Triumph	14.8	14.3	16.2	16.2	17.1	16.9	20.1	19.9	15.8	18.1	16.94
Cobbler	16.2	16.0	17.7	17.3	18.8	19.0	20.7	22.0	16.7	19.1	18.35
<u>Late</u>											
Bounty	-	16.2	16.0	17.1	19.4	18.0	20.1	20.5	15.8	18.4	17.94
B 73-3	17.1	17.3	17.5	19.4	17.5	17.7	21.8	22.9	17.1	20.8	18.91
B 2368-4	16.0	15.2	17.5	19.2	18.8	14.8	19.2	19.4	16.9	18.7	17.57
La 42-45	14.1	16.2	15.6	16.5	18.6	16.2	19.2	19.7	-	17.6	17.08
La 91-78	15.0	14.3	16.5	17.3	19.2	17.5	20.3	21.6	-	19.4	17.90
Red Pontiac	14.1	13.5	14.5	17.3	15.8	15.2	18.6	18.8	15.8	17.9	16.15
Ave. for loca- tion ^{1/}	15.42	15.65	16.99	17.68	18.82	17.62	19.91	20.95	16.42	18.85	

^{1/} Computed by averaging only those entries found at all 11 locations. (Not included are Neb. 45.51-3, Neb. 114.49-1x, Bounty, La 42-45, La 91-78)

North Central Table 4. Scab reactions reported^{1/}

	<u>Ind.</u>	<u>Iowa</u>	<u>Kan.</u>	<u>Mich.</u>	<u>Minn.</u>	<u>Nebr.</u>	<u>N.D.</u>	<u>Ohio</u>
	A T	A T	A T	A T	A T			
<u>Early</u>								
Neb. 45.51-3	-	5 -3	2-1	1 -1	3	1 -1	2-2	1-1
Neb.114.49-1x	-	1 -1	T-1	1 -1	5	2 -2	1-1	T-2
N.D. 3324-2	3-3	5 -2	3-2	1 -1	5	3 -3	2-2	T-1
N.D. 3631-6R	3-3	3 -1	1-1	T -1	5	4 -1	1-2	1-2
N.D. 4122-2	2-3	3 -1	1-1	1 -1	5	4-3	T-1	T-1
Wis Ag 29	1-1	1 -1	1-3	T -1	3	2-2	T-1	T-1
Wis Ag 56	1-1	2 -1	1-1	T -1	3	0-0	T-1	T-2
Wis Ag 59	2-2	4 -1	1-2	T -1	5	2-1	T-1	T-1
Triumph	4-3	5 -3	2-2	1 -1	5	4-2	2-3	T-1
Cobbler	2-3	5-3	2-2	T -1	5	4-2	2-3	1-2

<u>Late</u>								
Bounty	-	5-3	2-2	1 -1	5	4-2	1-3	T-2
B 73-3	4-2	5-4	2-2	1 -1	5	3-2	1-1	1-1
B 2368-4	2-3	2-2	1-1	1 -1	5	4-2	1-2	1-1
La 42-45	4-3	4-3	1-1	1 -1	5	2-1	1-2	-
La 91-78	4-3	5-2	1-1	1 -4	5	2-2	1-3	-
Red Pontiac	2-3	5-3	3-2	1 -1	5	3-3	2-2	1-2

<u>1/</u>	<u>Area</u>	<u>Type</u>
	T = less than 1%	1 = small, superficial
	1 = 1 - 20%	2 = larger, still superficial
	2 = 21 - 40%	3 = large, rough pustules
	3 = 41 - 60%	4 = large pustule, shallow holes
	4 = 61 - 80%	5 = large pustule, deep holes
	5 = 81 - 100%	

North Central Table 5. External and Internal Defects (Average for all locations)

	<u>Scab</u>	<u>Growth</u>	<u>Second</u>	<u>Sun</u>	<u>Hollow</u>	<u>Internal</u>	<u>Vascular</u>
	<u>Pct.</u>	<u>cracks</u>	<u>growth</u>	<u>Green</u>	<u>Heart</u>	<u>Necrosis</u>	<u>Discoloration</u>
		<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
<u>Early</u>							
Neb. 45.51-3	53.1	3.2	3.3	6.3	.2	.1	3.9
Neb.114.49-1x	26.3	1.3	4.5	.7	.3	.4	6.4
N.D. 3324-2	51.2	2.7	1.6	6.9	1.2	7.6	11.1
N.D. 3631-6R	40.3	4.3	1.0	1.0	0.0	1.1	9.1
N.D. 4122-2	35.2	1.3	1.5	9.7	.4	9.8	12.5
Wis Ag 29	21.4	1.1	1.8	5.2	.1	.6	8.2
Wis Ag 56	29.1	3.0	7.2	4.3	0.0	4.1	11.8
Wis Ag 59	30.7	7.1	1.2	6.3	.2	.4	8.7
Triumph	58.1	5.9	4.0	2.4	0.0	.1	9.3
Cobbler	62.9	1.1	2.4	5.3	.5	.9	15.0

<u>Late</u>							
Bounty	44.5	2.4	1.4	2.0	0.0	.6	10.4
B 73-3	61.3	2.1	5.6	5.0	.7	.9	11.0
B 2368-4	48.8	3.0	2.1	3.6	1.7	.8	14.3
La 42-45	27.5	1.3	1.3	2.7	1.2	1.4	6.6
La 91-78	45.2	.3	1.7	3.7	1.4	1.8	5.0
Red Pontiac	59.5	2.4	2.5	3.1	.5	.8	4.7

North Central Table 6. Merit Ratings

	<u>Ind.</u>	<u>Iowa</u>	<u>Kans.</u>	<u>Mich.</u>	<u>Minn.</u>	<u>Mo.</u>	<u>Nebr.</u>	<u>N.D.</u>	<u>Ohio</u>	<u>Wis.</u>	<u>Total</u> ^{1/}
<u>Early</u>											
Neb. 45.51-3						5	3				4
Neb. 114.49-lx											
N.D. 3324-2		4		2	1	2	4	1	1	5	28
N.D. 3631-6R		5					5				2
N.D. 4122-2		2	1	3	4						14
Wis Ag 29	1	3	2			3			2	3	22
Wis Ag 56	2		3					3	4		12
Wis Ag 59	4	1		1	3	1		4	3	4	27
Triumph											
Cobbler	3										3
<u>Late</u>											
Bounty			5	5	5	4	2	2		1	18
B 73-3											
B 2368-4	5		4						5	2	8
La 42-45					2		1	5			10
La 91-78											
Red Pontiac				4							2

^{1/} Merit points determined as follows:

<u>Merit Rating</u>	<u>Merit Points</u>
1	5
2	4
3	3
4	2
5	1

PACIFIC NORTHWEST
IDAHO (Aberdeen)
Darrel R. Bienz

Potato Breeding

Variety Testing and Verticillium and Scab Resistance. Approximately 550 clones were rated for maturity, Verticillium wilt resistance, and plant and tuber type in 1959. Many of these were also tested for Fusarium eumartii resistance, scab, leafroll, virus X and virus A resistance. In addition to the field trials at Aberdeen, tests for one or more of these characteristics were conducted at Rexburg, Parma, Tetonia, and Blackfoot Idaho. In addition, approximately 11,000 seedlings were grown at Tetonia and Aberdeen and from these 475 clones were saved for further testing. Most promising selections were tested in the greenhouse for virus A and virus X resistance.

The yield and Verticillium wilt resistance of six of the most promising seedling clones was compared with yield and resistance of Russet Burbank at Rexburg. The results are shown in Bienz table 1. Specific gravity was so variable that the apparent differences were not significant.

Bienz table 1.--Verticillium index and yield at Rexburg, Idaho, 1959.

Clone	Tuber type	Vert. index	Yield per acre	
			Total yield	U. S. No. 1's
			Cwt.	Cwt.
Al70-9	Lo Rus	5**	427**	312**
Al75-7	Ov Rus	4**	450**	406**
Al77-54	Lo Rus	5**	321	196
Al77-11	Lo Rus	13**	263	180
Rus Bur	Lo Rus	46	315	218
A394-11	Lo Rus	4	292	205

**Significantly better than Russet Burbank at the .01 level.

The Potato Selection Committee recommended that twelve clones be increased for testing for possible release. A501-13 has many excellent characteristics and was rated above Russet Burbank in tuber appearance. Al77-54 was again rated higher than Russet Burbank; however, because it has cream-colored flesh and had a relatively low yield this year, this variety does not appear as promising as was hoped. Al75-7, a selection which the committee has picked for several years, again rated high in tuber characteristics and yield. However, the committee voted to drop this selection because of poor processing characteristics.

The performance of the clones which the committee recommended for indexing and increase is compared with the performance of Russet Burbank and Early Gem in Bienz table 2. Al75-7 which had a higher than usual specific gravity this year is also included in this table for comparison.

One of the encouraging trends which this table shows is the increasing number of early selections which have good Verticillium resistance.

In addition to the trials conducted in Idaho, small samples of many promising selections and some seedling tubers were sent to Colorado, Washington, Oregon, California and Montana. Because of the demand for material in other States, the maintenance plots were enlarged.

Biens table 2.-Performance of clones selected for increase by the Potato Selection Committee, Aberdeen, Idaho, 1959.

Selection	Parentage	Vertical Illium		Scab	Sacks per Acre		Tuber	Maturity	Total
		Index	Aberdeen	Index	Total	U.S.	type		solids
		Rexburg	Aberdeen		Yield	No. 1's			Aberdeen
A501-13	B24-58 x A172-52	1	3	0	553	505	Lo Rus	ME	22.7
A177-54	B515-2 x Aguil1a	5	30	1-1	321	196	Lo Rus	ML	22.0
A175-7	B515-2 x B2913-24	4	25	0	450	406	Ov Rus	ML	21.4
A463-8	Kennebec x A163-17	-	15	0	-	-	Ov Rus	M	20.3
A463-4	Kennebec x A163-17	16	23	0	564	431	Lo Rus	L	22.0
A510-2	-	-	5	T	-	-	Lo Rus	M	20.5
A465-11	A183-5 x B3200-4	5	20	5-5	510	409	Lo Sl	M	22.2
A466-1	Kennebec x A177-52	3	15	4-5	721	429	Ro Rus	ML	21.2
A380-5	A115-21 x A124-116	4	20	0	514	257	Ov Rus	ML	23.3
A533-7	-	-	10	0	-	-	Lo Rus	ME	19.0
A466-2	Kennebec x A177-52	1	15	3-5	603	460	Ro Rus	ML	21.6
A170-9	Rus Bur x B986-7	5	30	0	427	312	Lo Rus	L	21.4
Russ. Burbank	-	46	80	0	315	218	Lo Rus	ML	20.9
Early Gem	-	-	75	0	-	-	Ov Rus	E	19.7

Processing Characteristics. Small samples of two selections and four varieties were processed into frozen french fries at the Idaho Potato Growers' Inc. at Idaho Falls in February. The chips were rated mostly on appearance. The fries were frozen and stored until the Selection Committee Meeting in October. At this time they were cooked in hot fat and sampled by the committee members. Quality was based on appearance, flavor, and texture.

Bienz table 3.--Processing characteristics of four potato varieties and two selections, Idaho Falls, 1959.

	Potato chips	Frozen French fries
Canoga	good	fair
Russet Burbank	good	excellent
Menominee	good	good
Kennebec	good	fair
Al75-7	poor	poor
Al77-54	fair	excellent

Fusarium eumartii Resistance Trials, Aberdeen, 1959. During the years of 1957 and 1958 several thousand acres of potatoes were left unharvested in Eastern and Southcentral Idaho because of a tuber rot believed to be caused by a fungus, Fusarium solani var. eumartii. Because it appeared that this disease might become of even greater economic significance during the years to come, arrangements were made to test a number of varieties and some of the more promising selections from the breeding program for resistance to this disease. A number of commercial varieties and seedling selections from the A.R.S. breeding programs at Aberdeen and elsewhere were found to be susceptible in our trials at Salmon last year, and these were not retested in 1959.

Our test in 1959 was planted in a field north of Blackfoot in which nearly 100 percent of the plants had been infected the previous year. The disease was so severe in 1958 that the tubers in this field were not harvested. Because the farm manager was anxious to avoid spreading the disease, this field was not fitted until after the planting on the remainder of the farm was completed. As a result, our plots were not planted until June 10.

Sixty-four varieties and seedling selections, including ten which had escaped the disease in our 1958 resistance tests, were included in the trials. Three replications, each containing a five plant plot of each selection, were planted. Russet Burbank checks were placed at the beginning and end of each plot. The trial was harvested on October 14.

Although most of the Russet check plants showed symptoms, usually only one or two tubers per plant were infected and most infected tubers showed only slight to medium symptoms in the vascular system at the stem end of the tuber. Probably less than ten percent would have been graded out had this field been harvested for commercial production. This was typical of most potato areas in the State.

The disease was much less severe in 1959 than it had been in previous years. Late planting may also have reduced the incidence of the disease in our plots.

Three of the ten selections--Canoga, White Rose, and Al70-9 which escaped infection in our test last year were free from the disease again in 1959.

In addition, eight other selections did not show symptoms in any tubers in the three replications. In every case the Russet Burbank test plants on both sides of the selection in at least one replication showed symptoms.

The selections which were free from the disease were: Conoga, White Rose, B2913-24, B3804-48, A463-7, A477-8, A483-4, A483-6, A495-15, A498-1 and A170-9.

Selections seem to vary a good deal in susceptibility and also in the way in which the symptoms were expressed. A number of clones appeared to be more susceptible than Russet Burbank. Even though no actual immunity to this organism has been found, it probably would be desirable to continue to test the more promising selections from the breeding program simply to insure that a clone more susceptible than Russet Burbank is not introduced as a variety.

Leafroll Resistance Test, Parma, Idaho, 1959. Ninety-six selections were tested for leafroll resistance in the field at Parma, Idaho, where commercial fields of Russet Burbank potatoes will frequently have 100 percent current season leafroll. Plots were planted so that each plot row was adjacent to a leafroll infected row of Russet Burbanks. Plots were examined periodically. Those which showed no symptoms or only slight leafroll symptoms were harvested in early October and examined for net necrosis symptoms in late November by Dr. R. E. Ohms, Idaho State Extension Potato Specialist. The results of this test are shown in Bienz tables 5, 6 and 7. B 2759-5 and B3804-48 have both shown excellent resistance to leafroll spread in the field during the past several years. The few plants of these selections which have contacted the disease were easily rogued and the disease did not spread from them to adjacent healthy plants. A371-1 and A374-13 have both survived replanting at Parma for two years. PI208332 and PI95162 have both been resistant at Parma during three years of replanting.

It is encouraging that the potato Selection Committee chose two varieties with some leafroll resistance, A380-5 and A466-1, for increase as possible new varieties. These were chosen for characters other than leafroll resistance which they possess.

Bienz table 5.--Leafroll and net necrosis reaction of some of the more resistant potato selections planted at Parma, Idaho, 1959, with seed grown at Aberdeen, Idaho, in 1958.

Selection	Parentage	Leafroll symptoms	Net necrosis		
			No. examined	No. necrotic	Severity
B2759-5	B24-238 x 247-24	None	8	0	0
B3804-48	B2925-23 x Katahdin	"	7	0	0
B3820-14	927-3 x Katahdin	"	7	2	1
B3807-6	B2944-65 x B2067-52	"	12	6	3
A371-1	B3195-3 x A115-10	"	-	-	-
A374-3	A163-4 x A115-9	Moderate	9	7	5
A376-11	Early Gem x A177-9	Slight	5	1	4
A378-7	A115-9 x A124-116	"	14	1	1
A380-5	A115-21 x A124-116	"	-	-	-
A390-15	A179-15 x A163-28	None	7	3	2
A394-1	A119-15 x A124-116	Slight	8	2	1
A411-9	A218-2 x A124-116	"	8	0	0
A464-10	Ontario x A163-17	None	8	2	3

Continued

Bienz table 5 continued.

Selection	Parentage	Leafroll symptoms	Net necrosis		
			No. examined	No. necrotic	Severity
A465-6	A183-5 x B3200-4	None	6	3	2
A477-8	A5-11 x A180-30	Slight	5	2	4
A495-6	X792-88 x B595-76	"	12	3	1
A502-2	B2759-5 x A163-17	Moderate	10	1	1
A506-1	B2759-5 x A180-30	None	6	2	1
A507-1	White Rose x B24-58	Slight	8	2	3
A321-1	White Rose x B2834-3	Severe	-	-	-
A372-11	A174-1 x A115-9	Moderate	-	-	-
A466-1	Kennebec x A177-52	Slight	-	-	-

Bienz table 6.--Leafroll reaction of clones which showed net necrosis resistance in 1958 or which have shown net necrosis resistance when grown in other areas.

Selection	Parentage	Leafroll symptoms	Net necrosis		
			No. examined	No. necrotic	Severity ^{1/}
Canoga	Katahdin x (Albion x Katahdin)	Moderate	6	3	5
Katahdin	40568 x 24642	Severe	11	4	3
A380-15	A115-21 x A124-116	"	12	4	2
A395-11	A119-8 x A124-116	"	14	7	4

^{1/} Severity: 1 slight, 5 severe.

Bienz table 7.--Leafroll and net necrosis reaction of clones which showed no or slight leafroll and net necrosis symptoms in 1958 and which were grown at Parma from seed harvested from the 1958 Parma leafroll plots.

Selection	Leafroll symptoms		Net necrosis symptoms			
	1958	1959	1958	1959		Severity
				No. examined	No. necrotic	
B3807-6	Recovery	Secondary symptoms	None	-	-	-
B3804-48	"	None	Slight	9	0	0
B3820-14	None	Slight (1 plant)	None	-	-	-
B2759-5	"	None	"	9	0	0
PI 22943	Recovery	Slight	"	-	-	-
PI 214374	Moderate	Moderate	Slight	9	2	4
PI 161695	Slight	Severe	None	-	-	-
PI 195162	VG Recovery	None	"	11	0	0
PI 208332	None	"	V. slight	13	5	2
PI 205623	VG Recovery	Severe (Some recovery)	None	-	-	-
A321-1	None**	Severe	-	-	-	-
A371-1	None	Slight	None	9	2	4
A372-11	"	Severe	"	-	-	-
A374-2	"	"	"	-	-	-
A374-8	Slight	"	V. slight	-	-	-
A374-13	None	None	None	8	0	0
A378-7	Slight	Slight	"	5	1	4
A380-5	Recovery	"	"	9	5	2

Continued.

Bienz table 7 continued.

Selection	Leafroll symptoms		Net necrosis symptoms			
			1958	1959		
	1958	1959		No. examined	No. necrotic	Severity
A411-9	Slight	Severe	Slight	-	-	-
A390-15	?	V slight	V slight	8	8	4
A392-2	Recovery	Severe	None	-	-	-
A394-1	Slight	Slight	"	-	-	-

Greenhouse Leafroll Resistance Test. Potato breeders do not know how leafroll resistance is inherited. Leafroll resistance likely depends on multiple factors. If independently segregating factors are involved, then with a cross between a resistant and completely susceptible clone it is possible that only one out of 256 seedlings would be resistant. Even with selfed resistant clones it is possible for the resistance factors to be arranged so that only about one of the progeny would show resistance.

With the usual procedure in the seedling year of selecting only plants which produce good yields of smooth tubers, those few clones possessing resistance are likely to be overlooked. Testing all seedlings having resistance factors in their parentage in an area where leafroll spread is severe might be a solution; however, susceptible lines are never completely eliminated by this method.

There has not yet been enough time to determine whether the greenhouse resistance test which was tried at Aberdeen for the first time this year will be successful. However, since the author will not be able to further test this method and since it did appear promising, a brief description is being included.

Seedpieces known to be infected with leafroll were planted in clay pots in the greenhouse in March. Greenhouse-grown seedling tubers harvested in January were planted in plant bands in 14" by 21" flats in early April. When the leafroll-infected plants were four or five inches high, they were caged and green peach aphids placed upon them. Aphid-proof cages made with 2 x 2 uprights and 1 x 2 crosspieces for the frame, very fine gauge nylon screen and weather stripping were placed over the seedling flats. As soon as the seedlings came through the ground aphids were placed upon them. At least one viruliferous aphid was brushed onto each seedling plant with a fine camel's hair brush. In early June, seedling plants were dusted to kill surviving aphids and planted three feet apart in the field.

Several difficulties were encountered. Because of warm temperatures in the greenhouse during April and May, aphids did not multiply in the cages as rapidly as was expected. Also emergence of the seedlings was not uniform which made it difficult to insure that aphids were placed on each plant and which also prevented us from transplanting into the field until the earlier plants had become spindly. Severe winds which occurred shortly after transplanting killed or broke off a number of these spindly plants.

Despite these difficulties, the results shown in Bienz table 8 appear surprisingly good. The high degree of resistance which seedlings with B2759-5 as one parent appear to possess does not correlate with observations in the 1957 and 1958 leafroll trials at Parma, Idaho, where the limited number of progeny of

B2759-5 tested have shown little resistance to leafroll. Possibly resistant seedlings could have been missed in our selecting from the seedling plants in the field, or possibly there is linkage between resistance factors and certain undesirable traits (rough tuber or late maturity, for example) which caused us to select non-resistant types. At any rate, it would seem that this technique deserves further research.

Bienz table 8.--Infection by leafroll of potato seedlings planted and inoculated in the greenhouse and transplanted to the field in June 1959 at Aberdeen, Idaho.

Family	Parentage/	Planted	Survived	With symptoms	Question- able	Free
		No.	No.	No.	No.	No.
A503	B2759-5 (VG) x B3200-2 (?)	77	66	30	8	22
A566	A327-3 (S) x Canoga (S1)	14	8	8	0	0
A570	A405-1 (S) x Canoga (S1)	26	16	15	0	1
A572	B2759-5 (VG) x A36-1 (S)	63	57	41	4	12
A577	B2759-5 (VG) x A36-3 (S)	26	21	12	2	7
A578	B3807-6 (S1) x A36-3 (S)	46	34	28	2	3
A596	B2759-5 (VG) x A183-11 (S)	62	49	29	5	15
A602	B2759-5 (VG) x A350-3 (NN)	58	56	37	8	11
A604	A327-3 (S) x A350-3 (NN)	44	38	33	4	1
A609	B24-58 (S1) x A405-1 (S)	23	15	14	1	0
A612	A327-3 (S) x A405-1 (S)	86	66	64	2	0
A613	A405-1 (S) x PI 208332 (R ₃)	20	18	12	2	4
A614	A327-3 (S) x PI 208336 (R ₁)	53	12	31	5	5
A615	White Rose (S1) x Canoga (S1)	45	38	31	2	5
A616	B2759-5 (VG) x Canoga (S1)	58	52	37	6	9
A618	Canoga (S1) x PI 208332 (R ₃)	64	45	24	6	15
A619	White Rose (S1) x PI 208332 (R ₃)	69	63	44	6	13
A620	B24-58 (S1) x PI 208332 (R ₃)	25	22	15	1	6
A621	B2759-5 (VG) x PI 208332 (R ₃)	74	67	44	2	21
A622	B2759-5 (VG) x B24-58 (S1)	49	46	32	2	12
A625	A321-1 (R ₂) x A36-3 (S)	34	20	18	1	1

1/ Leafroll reaction of parents: S = susceptible; S1 = slight resistance; R₁, R₂, R₃ = resistant 1 to 3 years; VG = very good resistance; NN = net necrosis resistance.

Greenhouse Test for Resistance to Verticillium Wilt. The scope of a potato breeding program is limited by the number of seedlings for which there is greenhouse space and also by the number of clones which can be effectively screened by the breeder. Since Verticillium wilt resistance is the most important aim of the breeding program at Aberdeen, Idaho, a method of eliminating susceptible seedlings in the greenhouse so that the space they occupy could be replanted would allow the breeder to screen many more potentially valuable seedlings than can presently be screened.

A method of inoculating suggested by Ray Webb was used with a number of seedlings in 1959. Pure agar cultures of Verticillium from three different locations in Idaho were mixed together with a small amount of water to form a spore suspension. As each seedling to be treated was transplanted to its individual pot about October 15, 1958, its roots were dipped into a spore suspension. The treated seedlings were set on a bench separated from the rest of the breeding program materials. For most of the families treated a number of untreated checks were transplanted at the same time and placed beside the inoculated seedlings for comparison.

No differences were observed between the inoculated and uninoculated seedlings for about eight or nine days. Starting about October 25, the inoculated seedlings began to show the effect of treatment. Some died quite abruptly, others began turning yellow, wilted and died slowly, and some wilted quite badly but recovered and showed no further symptoms. On a few the only symptoms were the yellowing and dropping of a few lower leaves. Many inoculated seedlings and almost 100 percent of the check seedlings remained without symptoms of any kind. Bienz table 9 shows the results of this test.

Bienz table 9.--Reaction of potato seedlings to inoculation with *Verticillium* wilt in the greenhouse at Aberdeen, Idaho, 1959.

Family	No. plants		No. healthy		Parents	Vert. Index of parents ^{1/}
			10/29	11/3		
A503	Inoc	48	22	10	B2759-5 x B3200-2	16
	Check	48	47	47		25
A492	Inoc	48	23	19	A183-8 x A139-1	5
	Check	48	48	47		-7
A588	Inoc	24	22	20	A31-13 x A180-24	27
	Check	24	24	24		7
A607	Inoc	24	14	11	A405-1 x A330-4	2
	Check	24	24	24		12
A610	Inoc	24	13	10	A173-3 x A405-1	37
	Check	24	22	22		2
A483	Inoc	24	18	14	Sequoia x A119-5	5
	Check	24	24	24		3
A564	Inoc	24	18	14	A116-58 x Canoga	5
	Check	24	24	24		-6
A455	Inoc	24	16	11	A180-24 x B3099-5	7
	Check	24	24	24		11
A580	Inoc	24	12	9	A36-1 x A36-3	-10
						-20
A583	Inoc	24	22	17	A377-6 x A36-3	12
						-20
A567	Inoc	24	11	8	A387-7 x Canoga	15
						-6

^{1/} The *Verticillium* index is an average of three readings of the percentage of dying by plants of the clone. Here they have been corrected by subtracting 5 points for medium clones, 10 for early, and 15 for very early ones and by adding 5 for late and 10 for very late clones. This is the reason for some negative readings.

Potato Breeding Techniques. Because of the increase in prevalence of potato virus diseases at Aberdeen where the USDA-University of Idaho Breeding Program is located, it has been deemed advisable to grow the first year seedling plants and a maintenance plot of promising selections at the Tetonia Branch Experiment Station. This station is located a considerable distance from the commercial potato area at an elevation of 6300 feet and the spread of disease there is almost nil.

Selecting in the field the promising single first year seedling plants is difficult even when they are grown in the area for which a new variety is being sought. When the seedlings are grown in an area like Tetonia where the

environment is quite different from that of the commercial potato area, it becomes even more difficult to select in the seedling generation. Since usually two or more seedling tubers form in each greenhouse pot, it theoretically is possible to grow duplicate plantings--in our case, one at Tetonia and one at Aberdeen. Seed tubers of clones which appear promising at Aberdeen could then be saved from disease-free plots grown at Tetonia.

The difficulty with duplicate plantings is one of mechanics. Since 15 to 20 thousand seedlings are grown in the greenhouse each year, a rapid method for planting is essential. A method which was quite successful this past year is briefly described below.

Essentially the method involves small paper cups and a dispenser. No. 45 (1-ounce capacity) cups are satisfactory and the dispenser is constructed by rolling heavy paper into a cylinder which has a very slightly larger diameter than that of the column of cups. (Old Manilla folders were used for our dispenser.) Dispensers are held in shape by small staples and masking tape. A one-inch square cut from one side of the bottom lip of the dispenser enables the cups to be removed one at a time when the tubers are planted.

In January or when the small tubers are harvested in the greenhouse, two tubers from each pot are placed one each in paired cups. The paired cups are arranged so that clonal tubers will be in identical positions in two dispensers.

Since the program at Aberdeen is designed to produce a russeted variety, 5 to 40 percent of the tubers of most crosses have russeted skins. The accuracy of planting is checked by alternating the russeted and smooth tubers, i.e., the first, third, fifth, etc. pair of tubers in each dispenser and subsequently in each plot in the field should be russeted. A record is kept of the number of russeted tubers in each cross. A number 8 rubber stopper is fitted inside a small cup and this cup and stopper are placed inside the top cup of the dispenser. The weight of the cork helps to push the cups to the bottom of the dispenser at planting time. The cups are pushed together as they are placed in the dispenser and masking tape is fastened over the top and bottom of the dispenser to hold the cups in place. The cross and the number of tubers it contains is marked on each dispenser. Thus, for each cross there are two identical dispensers--one for Tetonia and one for Aberdeen.

A two-row assist-feed planter is used to plant the seedling tubers. When the tractor is throttled down, two persons (one for each row) are able to remove the cups from the dispensers and empty the tubers into the feed mechanism as the planter moves slowly forward. We plant two red seedpieces or red seedling tubers to mark the end of each plot and the beginning of the next. Where the seedling tubers from a plot are indistinguishable from one another (i.e. where no russeted or colored tubers are present) a red or purple potato seedpiece or a pea or corn seed each 20 to 25 plants would provide a check on the accuracy of the planting.

SOUTHERN PROJECT
(Louisiana Headquarters)

T. P. Dykstra

A replicated yield plot of 44 seedling varieties was planted at the Experimental Farm at Baton Rouge, Louisiana in 1959. In 1958 this farm had been leveled to provide a drainage system. Since an overhead sprinkling arrangement had already been installed, conditions for a successful growing season appeared to be promising.

Unfortunately, in the process of leveling some of the topsoil and subsoil on the farm had exchanged positions. Where topsoil was present seedpieces emerged readily, where subsoil was predominant, the surface sealed over completely after excessive rains and in the absence of soil air, most of the seedpieces rotted, resulting in a total stand of about 30 percent. No yield records were obtained and only general observations on the seedlings were made.

A yield plot of 33 seedling varieties in Port Sulphur, Southern Louisiana gave satisfactory results (Dykstra table 1).

Another replicated yield plot of 31 seedling varieties was planted at Fairhope, Baldwin County, Alabama, in cooperation with Mr. Frank Garrett. Although this plot had been exposed to a severe hailstorm, which defoliated the plants when about 16 inches tall, the general results obtained were satisfactory (Dykstra table 2).

The 1959 growing season at the Cumberland Plateau in Tennessee, where the seedling increase plots are located, was almost ideal. The temperature remained fairly low and sufficient rainfall enabled a heavy yield to develop. These climatic conditions were also favorable for seed setting, as 1959 was perhaps the best year for making crosses in the field we ever experienced.

Promising seedlings. The most encouraging phase of the entire project is the development of several desirable fertile, blight and scab resistant red seedlings. Formerly it was necessary to depend upon white varieties to incorporate disease resistance in the reds; fertile disease resistant reds are now used in making crosses with other red varieties. This has resulted in much higher percentage of desirable reds in the progeny.

Among the red seedlings that are immune from the common strain of the late blight fungus and have commercial possibilities are TL 6894, TL 6896 and TL 6875.

Seedling TL 6279 was recently released jointly by the USDA, the Tennessee Agricultural Experiment Station and the Louisiana Agricultural Experiment Station as variety Catoosa. This red variety is immune from the common races of the late blight fungus and has considerable resistance to the scab organism. Regardless of seed source, the variety has compared favorably in yielding ability with Pontiac and LaSoda. It has been tested in all of the Southeastern States where it has given satisfactory performance as well as in a number of the Northern seed-producing States.

A number of the white seedling varieties have also given promising results from the standpoint of yield, appearance and disease resistance. By far the most outstanding of these is TL 6937. This seedling variety has not as yet been extensively tested but the preliminary results are excellent. In this variety are found a combination of many outstanding qualities. It develops a long white, and extremely smooth tuber. Under certain types of soil conditions an attractive russet type of skin develops. Climatic conditions which would render the Russet Burbank unsalable fail to develop any second growth in this variety. It is immune from the common races of the late blight fungus and has some resistance to scab. When grown in fertile soil under adequate moisture conditions, large smooth tubers develop. Under average growing conditions the tubers are smaller. The solids content of the tubers is high and the baking quality is excellent. It is an excellent chipper, either immediately after digging, or when reconstituted at 60° F. after 40° storage. This seedling will be tested for adaptability in some 30 States during 1960.

Seedling selections segregation for resistance to late blight and scab also were tested for these resistances in 1959.

Dykstra table 1. Seedling yields per acre at Port Sulphur, Louisiana, 1959.^{1/}

Accession No. T. L.	Parentage	U.S.No.1	Average
		Yield	Solids
		Bu.	Pct.
Catoosa	TL 1859 selfed	332	17.8
TL 6580	B 3131-21 x B 2368-4	330	18.3
TL 3769	Kennebec x B 522-33	288	17.6
TL 1859	Pontiac x X 96-56	282	19.7
TL 6088	LaSoda x B 2368-4	279	19.0
TL 6226	TL 2778 x B 2368-4	256	17.2
TL 2988	X 96-56 x Sebago	252	19.4
TL 3674	B 446-54 x Teton	226	17.1
TL 6543	B 2368-4 x B 2997-9	204	19.9
TL 6866	2910-1 x B 3131-8	203	18.4
TL 6875	B 2368-4 x B 3131-8	201	18.1
TL 6874	B 2368-4 x B 3131-8	199	20.3
LaSoda	Katahdin x Triumph	169	17.8
TL 6265	TL 2778 x B 2368-4	150	19.9
TL 6924	B 3203-6 x LaSoda	150	19.9
TL 6870	2910 x B 3131-8	139	17.6
TL 6831	B 2368-4 x B 2331-5	139	
TL 6043	B 355-24 x B 3160-12	139	
TL 6937	B 792-88 x B 962-32	133	20.0
TL 6153	I 1218 C-479 x B 2993-4 x I 947-10	131	21.2
TL 6006	B 874-35 x B 2997-9	120	21.4
TL 6896	2910-1 x B 3131-8	125	18.9
TL 6932	1276-185 x B 773-21	119	20.6
TL 6539	B 3131-21 x B 2368-4	119	20.6
TL 6894	2910-1 x B 3131-8	112	19.1
TL 6609	B 2368-4 x B 3131-8	112	20.3
TL 6225	TL 2778 x B 2368-4	111	19.4
TL 6536	B 2368-4 x B 2997-9	108	

continued

Dykstra table 1, continued.

Sebago		102	18.1
TL 6900	B 2368-4 x B 3131-8	97	17.1
TL 6603	B 2368-4 x B 3131-8	79	17.8
TL 6095	LaSoda x B 2368-4	78	
TL 6522	B 2368-4 x B 2997-9	54	

1/ Each plot = 1/400 acre.

Dykstra table 2. Seedling yields in bushels at Fairhope, Alabama.^{1/}

Accession No. T. L.	Parentage	U. S. No. 1	Average
		Yield	Solids
		Bu.	Pct.
TL 6088	LaSoda x B 2368-4	350	16.2
TL 6580	B 3131-21 x B 2368-4	350	17.4
TL 3769	Kennebec x B 522-33	323	15.4
TL 6078	Triumph x B 2368-4	288	16.7
TL 2988	X 96-56 x Sebago	286	17.8
LD 42-45		278	15.2
TL 6226	TL 2778 x B 2368-4	275	17.0
TL 6543	B 2368-4 x B 2997-9	274	17.2
TL 3674	B 446-54 x Teton	273	15.4
Catoosa	TL 1859 selfed	271	15.2
TL 6593	B 3114-12 x B 2997-9	263	15.5
TL 6866	2910-1 x B 3131-8	257	14.8
TL 6875	B 2368-4 x B 3131-8	255	16.6
TL 6831	B 2368-4 x B 2331-5	255	15.5
TL 6870	2910-1 x B 3131-8	248	15.5
LaSoda	Triumph x Katahdin	247	15.6
TL 6043	B 355-24 x B 3160-12	247	16.6
TL 6265	TL 2778 x B 2368-4	243	17.4
Sebago		241	16.0
TL 6937	B 792-88 x B 962-32	234	17.8
TL 6861	2910-1 x B 3131-8	221	16.8
TL 6225	TL 2778 x B 2368-4	211	17.9
TL 6539	B 2368-4 x B 2997-9	205	15.8
TL 6006	B 355-24 x X 96-56	188	18.1
TL 6095	I 1215 C 241. B 2874-4 x I 947-1-a	182	19.2
TL 6603	B 2368-4 x B 3131-8	170	16.5
TL 6536	B 2368-4 x B 2997-9	168	16.2
TL 6145	B 2993-4 x I 947-10	161	
TL 6136	B 2875-8 x I 947-10	145	18.1
TL 6522	B 2368-4 x B 2997-9	140	17.1
TL 6003	B 874-35 x B 2997-9	125	15.7
L.S.D. 5%		76	
L.S.D. 1%		101	

1/ This test conducted in cooperation with Frank Garrett. Three replications of each plot (30 plants) were planted.

Dykstra table 3. Advanced seedlings selected for testing for yield and adaptability by cooperating agencies, 1959.

State	Cooperator	Purpose	Number of Seedlings
Alabama	F. Garrett	Yield plot	16
Hastings, Florida	E. N. McCubbin	Yield plot	6
Homestead, ^{EE}	J. C. Noonan	Yield plot	6
Louisiana	Julian C. Miller	Yield plot and observation	51
Louisiana		Scab resistance	43
Louisiana		Blight resistance	48
Mississippi	W. S. Anderson	Yield plot	5
North Carolina	F. Haynes	Yield plot	4
South Carolina	W. R. Sitterly	Yield plot	6
Tennessee	T. R. Gilmore	Yield plot	17
Texas	D. McLean	Yield plot	7
Colorado	J. L. Weigle	Increase	3
Nebraska	W. Trank	Increase	10
Maine	A. E. Schark	Increase	5
Minnesota	F. I. Lauer	Increase	2
North Dakota	J. W. Weston	Increase	3
North Dakota	B. Picha	Increase	2
Wisconsin	M. Rominsky	Increase	11
Canada	G. R. Johnston	Increase	3

CALIFORNIA
Glen N. Davis

Potato varietal yield test plots were planted in Kern and San Benito Counties in 1959.

The plot in Kern County consisted of 25 different varieties, each replicated five times with 25 seedpieces planted per replication. The White Rose variety was used as the check. White Rose produced the highest yield recorded in 21 years of varietal testing in Kern County. The mean weight of potatoes produced per replicate was 99.4 pounds, or almost 650 one-hundred-pound bags per acre. No other variety tested in 1959 even approached this figure. The data are presented in California table 1.

The plot in San Benito County was not very satisfactory. Due to an unfortunate incident with the thermostat on the seed storage chamber, much of the seed reserved for the San Benito plot was frozen and some of the other was damaged. As a result, sufficient seed was not available for a uniform number of replications and the stand obtained was not uniform. As a result, no attempt at statistical analysis of yield data was made. The yield data presented in California table 2 represent the mean yield in pounds per replicate corrected for a stand of 25 hills per replicate.

In addition to the replicated yield test in Kern County, a single hill each of approximately 8,500 first-generation seedlings representing 46 different parental combinations was grown. The mature plants were harvested individually and 17 were selected for additional testing in larger plantings. Thirty-six advance generation seedlings from Dr. A. E. Kehr (Iowa State College) were placed in 3 to 10 hill plantings for observation. No selections were saved from this material.

A large number of crosses were made in the greenhouse during the winter of 1958-59. Nineteen different combinations involving 9 different parental lines were included in the crosses. In addition, seed of sixteen different combinations (with White Rose as the female parent in each cross) were obtained from Dr. D. E. Bienz of the Aberdeen, Idaho Station. Seedlings numbering approximately 8,000 from the above crosses are now being grown in an insect-proof screen house. Tubers from these seedlings will be planted in Kern County for observation and selection in the summer of 1960.

California table 1.--Potato variety yield test - Shafter, California, 1959.

Variety	Mean yield ^{1/}	Solids	Variety	Mean yield ^{1/}	Solids
	Lbs.	Pct.		Lbs.	Pct.
Norland	56.2	18.9	N.D. 4122-2	48.1	20.4
N.D. 3740-11	40.1	19.7	Excel	49.4	22.4
Haig	50.0	21.4	Norgleam	41.4	20.2
Nordak	45.0	20.9	Kennebec	58.2	20.4
N.D. 3885-1R	45.9	20.7	11889	36.1	20.5
N.D. 3324-2	67.7	20.7	Huron	47.5	21.7

continued

California table 1 continued.

Variety	Mean yield ^{1/}	Solids	Variety	Mean yield ^{1/}	Solids
	Lbs.	Pct.		Lbs.	Pct.
LA 1859	53.7	20.5	Merrimack	42.6	21.4
12240	48.0	20.2	B2368-4	77.3	20.5
Menominee	50.3	22.4	Sequoia	73.3	20.5
B73-3	45.4	21.7	Chippewa	62.5	18.9
11888	34.7	20.4	Onaway	39.6	18.7
Dazoc	16.2	20.4	White Rose	99.4	20.5
13178	54.8	21.2			

L.S.D. = 12.45 lbs. between means

^{1/} Size of whole plot = 1/6 acre, fertilizer rate = 16-20-0 at 600 lbs. per acre and means obtained from 5 replications.

California table 2.--Potato variety yield test, San Benito County, California, 1959.

Variety	Mean yield ^{1/}	Solids	Maturity date ^{2/}	Variety	Mean yield ^{1/}	Solids	Maturity date ^{2/}
	Lbs.	Pct.			Lbs.	Pct.	
Kennebec	33.7	19.0	9-3	B2368-4	55.5	17.9	10-1
Merrimack	47.7	20.4	10-1	B73-3	43.0	20.5	9-3
Onaway	25.7	18.7	9-1	C.S. 12240	43.7	20.2	10-1
Sequoia	49.5	16.7	10-1	B4132-3	42.0	19.9	10-1
Chippewa	52.5	16.9	9-17	B4132-4	28.7		10-1
Norland	12.5		9-3	B4773	34.0	19.4	10-2
Menominee	70.0	18.7	10-2	B4304-11	36.2	18.9	10-2
11888	24.2	19.2	9-17	B4075-1	75.0	19.7	10-1
11889	50.0		10-1	B4344-4	30.0	18.9	10-1
LA 1859	77.5	19.7	10-1	B3907-9	45.5	14.3	9-4

^{1/} Size of whole plot = 1/2 acre, fertilizer rate = ammonium sulphate 600 lbs. per acre, and means yields were corrected for stand of 25 hills per replication.

^{2/} Date on which plants were dead.

CANADA (Ontario)
G. R. Johnston and R. G. Rowberry^{1/}

Weather conditions at the Ontario Agricultural College's potato farm were very favorable for plant emergence and growth in May and June. Planting was completed the last week of May. Rainfall was deficient in July, August and September. Irrigation was used several times to supplement the sparse rainfall. Temperatures were much above normal in late August and early September. In spite of irrigation, many of the late-maturing varieties were severely affected by second growth in the form of sprouts, knobs and sprout tubers. Total solids contents of many of the late varieties were lower than normal.

All plots received 1200 pounds per acre of 6-12-12 fertilizer in a split-band at planting time. All trials were planted in 36-inch rows from cut "A"-size seed at 10-inch spacings. A weekly spray program of DDT plus "maneb" was carried out. This was supplemented with Phosdrin for aphid control starting the last week of July.

The data of maturity (tops), yielding ability (high, medium or low), total solids, cooking quality scoring and the external tuber defects (scab, Rhizoctonia and silver scurf) are presented in Ontario table 1. Several of these seedlings and varieties are outstanding and will be increased and further evaluated more extensively in 1960. Some of these are B605-10, Norland, Blanca, Navajo, I803-1, ND3569-1Ru, B3557-40, X927-3, Neb.315.48-2X, ND3324-2, Ia1111-8 and Minn.20.

Sincere appreciation is again extended to the United States Department of Agriculture and the State Experimental Stations for their kindness in making available their promising potato seedlings and varieties for inclusion in the Ontario Agricultural College's testing program. We hope that the data presented is of some interest to our American co-workers.

^{1/} Canada Department of Agriculture, Field Husbandry Department, Ontario Agricultural College, Guelph; and Ontario Department of Agriculture, Field Husbandry Department, Ontario Agricultural College, Guelph, respectively.

Ontario table 1.--Potato seedlings and varieties of USA origin grown in adaptation trial at the Ontario Agricultural College, Guelph, Ontario, Canada, in 1959.

Variety	Years tested	Maturity	Yield No. 1	T.S. (%)	Cooking scores (100)	External tuber defects			
						Scab		Rhiz.	S.scurf
						Ar.	Ty.	Ar.	Ar.
I 1401-1	1	M	M	20.0	91	2	2	0	4
I 1403-4	1	M	M	18.7	89	2	2	0	2
R 133-14	1	M	H	17.3	82	2	1	0	2
R 113-16	1	M	M	16.8	72	1	1	0	2
R 113-24	1	M	M	17.7	83	3	1	2	3
R 123-9	1	L	M	17.3	75	1	1	0	2
R 133-9	1	M	H	16.8	83	1	1	1	2
R 220-7	1	M	M	18.7	81	2	2	2	6
R 334-1	1	E	H	18.5	82	3	1	2	4
R 360-7	1	M	M	16.8	77	2	1	0	3
Ia 1037-1	1	M	M	20.0	90	2	1	2	2

Continued.

Ontario table 1 continued.

Variety	Years tested	Maturity	Yield No. 1	T.S. (%)	Cooking scores (100)	External tuber defects			
						Scab Ar.	Ty.	Rhiz. Ar.	S.scurf Ar.
Ia 1111-16	1	M	M	18.3	90	1	1	1	2
Ia 1157-3	1	M	M	21.1	93	2	1	0	2
Ia 1193-W2	1	L	M	23.4	90	1	1	1	2
Ia 1225-OH23	1	L	M	19.6	86	1	1	1	5
Ia 1311-1L	1	VL	L	20.4	83	3	3	0	2
Ia 1317-SM	1	M	M	18.3	80	0	0	0	2
Ia 1346-17M	1	L	H	17.9	80	0	0	0	3
Ia 1346-19M	1	E	H	16.4	82	0	0	0	3
MS 1392-11M	1	E	M	15.6	69	2	1	2	2
MS 1408-4M	1	L	H	16.8	77	2	1	0	2
MS 1410-1M	1	L	H	16.0	78	2	1	2	2
MS 1426-3M	1	L	H	17.1	78	2	1	0	2
B 3114-52	1	M	M	19.0	89	1	1	0	3
B 3429-23	1	L	H	17.5	87	1	1	1	2
B 3557-40	1	L	M	20.6	92	2	1	0	4
Navajo	1	M	M	19.6	89	2	1	1	2
Blanca	1	L	H	20.6	81	1	1	0	2
CS 11888	1	M	H	19.2	78	1	1	1	4
CS 11889	1	E	M	18.3	84	1	1	1	3
CS 11918	1	L	M	18.7	85	2	1	2	2
CS 13222	1	E	M	17.9	84	0	0	2	4
CS 13928	1	M	H	20.6	82	0	0	1	3
F 29-1	2	M	M	17.3	77	1	1	0	2
P50.4-52-40	2	E	L	16.2	82	0	0	0	2
ND 3569-1 Ru	2	E	H	17.9	91	0	0	0	2
ND 3203-6R	2	E	L	15.4	65	2	4	1	3
ND 3676-21 Ru	2	E	M	19.2	83	1	1	2	2
ND 3307-2	2	E	M	18.5	81	2	1	1	3
ND 3707-1R	2	M	H	17.9	72	0	0	1	2
ND 2555-12R	2	E	M	18.3	76	2	1	1	3
ND 3023-B-10R	2	E	M	18.3	80	3	1	2	3
ND 3631-5R	2	M	M	17.3	73	0	0	0	3
ND 2128-20	2	M	M	18.1	83	2	1	0	3
B 920-7	2	E	L	19.0	-	3	3	1	2
B 3309-4	2	M	M	16.4	71	2	1	0	3
B 3397-17	2	M	M	18.1	81	2	1	0	3
B 1339-12	2	L	L	17.3	75	3	1	0	2
B 69-16	2	L	L	18.3	78	2	1	0	2
B 2368-4	2	L	H	18.1	76	0	0	0	2
B 3309-8	2	M	M	16.8	75	2	1	1	3
B 3319-30	2	M	L	17.5	83	2	1	2	4
B 3391-2	2	M	M	17.5	73	2	4	0	4
B 3692-4	2	M	M	18.7	83	2	1	2	2
La 1859	2	M	H	17.5	80	1	1	2	5
X 927-3	2	L	M	21.1	91	2	4	0	3
B 3556-11	2	VL	M	22.3	87	2	1	0	2
I 911-2	2	E	M	19.8	89	2	1	2	3
Bounty	2	M	M	17.9	78	2	4	2	4
Neb.315.48-2X	2	M	H	19.6	86	2	1	2	4
Excel	2	L	M	21.1	85	2	1	2	4

Continued.

Ontario table 1 continued.

Variety	Years tested	Maturity	Yield No. 1	T.S. (%)	Cooking scores (100)	External tuber defects			
						Scab		Rhiz.	S.scurf
						Ar.	Ty.	Ar.	Ar.
Wis.X137.52	2	M	M	19.6	81	2	1	3	3
Wis.AG120	2	L	M	18.7	80	1	1	2	2
Wis.O112	2	M	M	19.0	79	2	4	2	4
Wis.AG29	2	M	M	18.5	83	1	1	2	4
Wis.O103	2	M	M	18.3	81	3	3	2	3
Wis.M804	2	L	L	17.9	83	1	1	2	7
Irish Cobbler	Check	E	M	19.4	91	3	4	2	3
Katahdin	"	L	M	18.1	76	3	4	2	2
Red Pontiac	"	L	H	15.2	69	3	4	2	4
Sebago	"	VL	H	16.4	74	2	4	1	2
Hindenburg	"	VL	L	22.1	74	0	0	2	4
Ia 1111-20	3	M	M	18.5	83	2	1	1	4
Ia 1106-5	3	M	L	19.0	85	2	1	0	3
Ia 1109-9	3	M	M	19.4	89	1	1	2	4
Haig	3	E	M	18.7	82	0	0	3	2
ND 2774-3R	3	E	M	17.7	75	2	1	2	3
Minn.20	3	M	M	18.7	85	3	1	0	7
Neb.77.44-1	3	M	M	17.0	77	0	0	2	7
Neb.83.49-1	3	E	M	19.4	90	2	1	2	3
I 803-1	3	M	M	18.1	82	2	1	2	3
I 961-1	3	M	M	17.5	83	0	0	3	3
I 1092-2	3	M	M	19.6	80	2	1	0	4
Ia 1111-5	3	L	H	18.5	83	2	1	2	3
Ia 1111-8	3	L	H	20.6	85	2	1	2	4
Neb.215.50-2	3	M	H	18.5	82	1	1	1	4
Neb.315.48-3X	3	M	H	18.3	84	1	1	2	4
Russet Cherokee	3	M	M	17.9	75	0	0	0	4
B 2894-24	3	L	H	18.1	84	2	1	1	2
I 1111-10	3	L	H	20.8	89	2	1	2	3
I 801-10	3	VL	H	21.3	91	2	1	0	3
I 8140-1	3	VL	H	20.2	87	1	1	2	4
ND 3324-2	3	E	H	17.9	82	2	1	2	2
B 605-10	3	E	H	19.0	86	2	1	1	3
Norland	3	E	H	16.0	79	1	1	1	3
Redbake	4	M	H	17.5	78	2	1	2	6
Delus	5	L	M	21.1	83	2	1	1	2
Norglean	6	VE	M	18.5	91	2	1	2	3

- Notes: 1. Cooking scores are the sum of texture - 40, color - 20, flavor - 25, sloughing - 15.
2. Scab type - USDA system: 1-5; 1 - superficial, 5 - deep or pitted.
3. External tuber defects: Area - 1 to 9. 1 - trace; 2 - 1 to 5%; 3 - 6 to 10; 4 - 11 to 20; 5 - 21 to 30; 6 - 31 to 40; 7 - 41 to 50; 8 - 51 to 75; 9 - 76 to 100%
4. Yield (Canada No. 1): H - high, M - medium, L - low.

COLORADO

J. L. Weigle, C. W. Frutchey, and A. M. Binkley

Variety Trials

Trials were conducted in the Gilcrest early district, the San Luis Valley, and the Fort Collins area; the same locations as last year. Data compiled from these trials are recorded in the accompanying tables. Specific gravities were obtained by comparing weight in air with weight in water using a Toledo balance. The specific gravities were then converted to percentages of dry matter using Von Scheele's conversion table. The percentages of reducing sugars were determined by Hassid's Ferricyanide Method on a dry weight basis. The chip color data represents the Rd readings of a Gardner Color Difference Meter using a light yellow standardization plate which has an Rd value of 61.7. Commercial potato chips purchased from local stores had Rd values which ranged from 25 to 48 with an average of 35. The Colorado markets seem to demand a lighter colored chip than other markets and most processors try to produce chips that have an Rd value of 35 or higher. However, there is some demand in this area for a browner chip particularly among the people who have just moved here from other regions. These lab tests were conducted under the direction of Dr. H. W. Chapman of this station.

The variety Blanca was recently released jointly by the U. S. Department of Agriculture and the Colorado Experiment Station. It had been tested under the Colorado seedling number 12240.

Gilcrest. This plot was planted April 17 in the early market district south of Greeley, Colorado. The soil is light and sandy and the irrigation water is obtained from wells. The plot was irrigated at an interval of from four to six days, depending on soil moisture conditions. The fertility level for this plot was high as the field had been manured frequently and generous amounts of commercial fertilizer used yearly.

The plot design was a randomized complete block with four replications. Each individual plot contained two rows of twenty-five hills each. The seedpieces were placed by hand at a ten-inch interval in the row and the rows were thirty-four inches apart. The harvested tubers were run over a two and one-fourth inch screen to obtain the number one size.

The results of this trial are shown in Weigle table I. The most significant factor appears to be the absence of scab damage in the variety Haig while most of the other varieties were severely affected. It should be noted here that the figures for U. S. No. 1's in this table ignore the grade out due to scab. This was done so that the yields would be comparable to those obtained had scab been absent. Thus, the actual amount of salable potatoes would be considerably less in many cases.

Another interesting factor found in this year's data was the low Rd values recorded for chip color. Chips made from tubers grown in this plot were decidedly browner than those made from tubers of the same variety grown elsewhere in the same general area. This year's Rd values were also considerably lower than last year's for this same plot. Moreover, this year's reducing sugar values were lower than last year's and, considering the Rd values, this is the opposite of what is generally expected. A search for other possible causes showed that a very high nitrogen level could have been responsible for the darker color of chips.

San Luis Valley. Three different trials were planted May 12 in the San Luis Valley this year. The varieties were divided as to tuber color and maturity. All three plots were handled in the same manner. The designs were six by six latin squares. Each plot contained two rows thirty feet long with the rows three feet apart and the seedpieces spaced fifteen inches apart in the row. The trials were furrow irrigated instead of sub-irrigated this year because of the scarcity of water.

This year was not as satisfactory for potato growing as was last year with the result that both yields and specific gravities are down. The potato chip color, in general, was also darker this year. This fact combined with higher than usual reducing sugar reading may indicate the tubers were slightly chilled at some point before processing. The problem may be important in this location, where on the occasion of a particularly cold fall, the tubers might be chilled either in the ground or during harvesting.

The data for the early to medium maturity white varieties are found in Weigle table 2, Trial A. The best varieties for chipping appear to be C. S. 13222 and Haig. Although ND 3324-2 was a better yielder, it chipped too dark. Cobbler didn't do well on either chipping or yield.

Weigle table 2, Trial B contains the data for the white varieties that are later in maturity. Of this group, Kennebec was the best considering both yield and chip quality. Russet Rural and Delus are both good chippers, but didn't do as well in yield. Navajo yielded below average in this trial because of poor stand.

The yield and dry matter data for the red varieties are found in Table 2, Trial C. Although the Red Pontiac out-yielded the Red McClure in No. 1's, it was much lower in dry matter content. This factor is important both in processing and quality of table stock. The Wyoming seedlings have better color than McClures, but, besides being lower in yield, they also contain hard spots when cooked.

Fort Collins. This trial was planted May 16 in heavy soil at the Horticulture Experiment farm northeast of Fort Collins. It was fertilized at planting time with 200 pounds per acre of 13-39-0, and it was furrow irrigated at an interval of seven days. Irrigation was discontinued two weeks before harvest and the vines were beat off ten days before harvest in order to set the skin on the tubers.

Six varieties of potatoes suitable for chipping were planted in this trial in a latin square design. Each plot contained two rows twenty-five feet long with a thirty-six inch space between rows. The spacing in the row was not uniform in this trial as an attempt was made to use the optimum seedpiece spacing for each variety. Thus, the number of seedpieces varied from variety to variety as the length of row in each plot remained the same.

Table 3 indicates the seedpiece spacing for each variety, as well as the other data obtained from this trial. The yields, in general, were considerably below last year because the growing season was less favorable for tuber production this year. However, the relative yield among the varieties remained essentially the same. The variety Rukat did well as far as yield is concerned, especially when the low grade out is considered. However, it was the lowest in dry matter and chip color so that it does not appear to have the makings of a good chipping potato. The new variety Navajo had a considerably lower yield in comparison to the other varieties than should be expected. This was the result of a poor stand in this trial.

Several new varieties and other varieties not commonly grown in Colorado were included in an observation trial at Fort Collins. These varieties were tested in the laboratory for chip quality and the results of these tests are shown in Table 4. The varieties Saco, Canso, and Keswick appear to have promise as chipping potatoes in this area and will be tested further. The variety Bounty had a good appearance in the field and will be tested with the standard red varieties next year.

Breeding Program

Seed and seedling production. Seed was produced in the greenhouse from crosses made in late winter and early spring. The parent plants were grown in four inch pots and cuttings were taken with flower clusters attached. Cuttings were also obtained from parent material grown at the USDA Station, Greeley, Colorado. The pollinations were made and the cuttings were grown in glass jars containing nutrient solution until the seed balls matured as in the method described by McLean. The seedling tubers were produced in the greenhouse in the usual manner.

Field screening and seed increase. An isolated plot is maintained at the San Luis Valley Branch Experiment Farm for the growing of the seedlings. This area is relatively free of insects that spread potato diseases so that it should be possible to maintain stock with a minimum of trouble from virus diseases. The single hill lots are grown here, as well as, seed increase of all the selections. After the first year the selections are also grown at Fort Collins to test adaptation in that area.

Purpose of breeding program. This program is set up in three phases. One phase is concerned with the production of a round white variety which has good chipping qualities, high yield, resistance to scab and leaf roll, and tuber characteristics satisfactory for processing. Another phase is the development of a red variety which will retain good color and market quality after storage, and be resistant to scab and virus X. This variety also has to be hardy enough to grow in the San Luis Valley and be able to recover rapidly from frost or

hail damage. The development of early market types is the third phase. The primary concern here is with early reds that hold their color and ship well. However, scab resistance would be of value in this area also.

Results of breeding program. As this program is still in its early stages it has not produced any advanced seedlings as yet. However, several of the selections do show some promise for chipping purposes.

Weigle table 1. Gilcrest Trial, Carl Linden Farm, planted April 17, Harvest August 5, 1959.

Variety	Tuber color	Maturity	Yield/A.		Total Solids	Chip		Scab Infection			Other Defects
			Total No.1	U.S.		Reducing sugars	color	Tubers Infected	Coverage Per tuber of reaction	Severity	
Red LaSoda	R	ML	389	367	17.9	-	-	95	5-10	4-5	
Cobbler	W	ME	366	334	18.5	1.22	26.5	90	3-5	1-5	Off-shape
Dazoc	R	E	333	314	17.1	-	-	95	3-5	1-5	
M-355	W	ME	331	310	19.7	1.06	29.3	85	1-2	1-5	Off-shape
P-40	R	E	317	279	17.7	-	-	95	1-2	3-5	Numerous rots
Norland	R	E	308	274	16.7	-	-	90	3-5	1-2	
Haig	W	ME	308	272	18.9	1.03	27.5	0	0	0	
Manota	W	ME	301	270	18.7	1.13	24.9	95	1-5	1-5	Greenheads
Nordak	W	E	288	269	18.6	1.14	28.7	90	1-2	1-5	Greenheads
W-0112	W	ME	288	261	19.6	1.93	28.6	80	1-2	1-5	
M-20-20-34-6	W	ME	284	256	17.3	1.32	29.1	80	1-2	3-5	G. heads & off-shape
Redkote	R	M	283	255	17.8	-	-	90	3-5	1	
M-20	W	ME	282	252	20.3	1.44	27.4	75	1-2	1-3	G. heads, Growth cracks
C.S. 11889	W	ME	273	241	18.3	1.14	28.7	50	1-2	1-3	
M-6	W	ME	257	235	21.2	1.11	29.4	95	2-3	3-5	Off-shape
Norgleam	W	ME	252	227	17.9	1.12	30.4	95	3-5	3-4	

Weigle table 2. San Luis Valley trials, Branch Experiment Station, Planted May 12, Harvested September 16, 1959.

Variety	Tuber color	Yield per acre		Total solids	Reducing sugars	Chip color Rd value
		Total Cwt.	U.S. #1 Cwt.			
<u>Trial A - Early to medium</u>						
ND 3324-2	W	238	218	18.6	1.37	25.9
Russet Burbank	Rus	230	191	18.4	1.50	29.2
C. S. 13222	W	206	191	19.8	1.63	32.5
Haig	Rus	201	179	18.4	1.21	32.2
Cobbler	W	177	144	18.6	1.74	26.7
C. S. 11889	W	106	99	17.6	2.21	21.6
L.S.D. 5%		27	24			
L.S.D. 1%		36	33			
<u>Trial B - Medium to late</u>						
Kennebec	W	351	310	19.3	1.27	30.9
Katahdin	W	333	316	19.6	1.45	26.2
Russet Rural	Rus	297	253	21.4	1.08	31.7
Blanca	W	244	230	20.6	1.29	28.9
Delus	W	213	198	18.8	1.30	31.5
Navajo	W	203	188	19.9	1.37	25.2
L.S.D. 5%		29	30			
L.S.D. 1%		40	41			
<u>Trial C - Reds</u>						
Red Pontiac	R	355.3	324	17.3		
Red McClure	R	355.0	294	21.5		
Red LaSoda	R	278.8	248	19.4		
Wyo. 2665	R	258.2	235	19.8		
Wyo. 2550	R	253.6	221	21.1		
Norland	R	137.2	124	16.0		
L.S.D. 5%						
L.S.D. 1%		27	23			
		37	31			

Weigle table 3. Fort Collins Trial, Horticulture Farm, planted May 16,
Harvested September 10, 1959.

Variety	Tuber color	Spacing in row	Yield per acre		Total solids	Reducing sugars	Chip color Rd value
			Total Cwt.	U.S.#1 Cwt.		Pct.	
Kennebec	W	10 th	279	205	21.7	0.93	38.2
Katahdin	W	12 th	254	198	21.6	0.76	38.9
Rukat	W	10 th	239	207	20.0	1.14	30.1
Blanca	W	14 th	217	163	21.8	0.91	35.3
Russet Rural	Rus	12 th	173	150	23.3	0.77	36.2
Navajo	W	12 th	142	114	23.3	0.66	38.2
L.S.D. 5%			30	28.4			
L.S.D. 1%			40	38.7			

Weigle table 4. Observation plots, Fort Collins Horticulture Farm, planted
May 23, harvested September 10, 1959.

Variety	Tuber color	Total solids	Reducing sugars	Chip color Rd value
			Pct.	
Columbia Russet	Rus	21.9	1.61	27.9
ND 3324-2	W	20.7	1.54	30.3
Huron	W	21.6	1.05	26.9
Saco	W	24.3	0.55	35.1
Canso	W	23.1	0.59	34.8
Keswick	W	22.7	0.95	35.3
Rushmore	W	22.3	0.98	33.1
Bounty	R	22.5	0.71	31.5
Teton	W	20.9	0.75	31.5
Chippewa	W	19.2	3.17	31.2

CONNECTICUT
Arthur Hawkins

Potato Variety tests were conducted by the Storrs Agricultural Experiment Station, Storrs, Connecticut, on two commercial potato farms in the Connecticut River Valley in 1959. Experimental procedures, total yields, yields over 1-7/8", yields over 1-7/8" with seriously off-shaped tubers removed, dry matter, and tuber observations are given in Connecticut tables 1 and 2 with footnotes.

Considerable aphid damage occurred at the Wapping location in mid-August until a newer and more effective aphicide was applied. This accounts for low percentage of U. S. No. 1 size and lower yields of some of the later-maturing varieties. Heavy showers in August and September and poor drainage, as a result of rows not being on contour, resulted in excessively wet conditions at the Somers location.

Katahdin x-free source produced substantially better yields than the regular Katahdins. However, seed tubers of the Katahdin x-free, and weak x included in the tests were appreciably larger than those of the regular Katahdins. Seed pieces were cut to $1\frac{1}{2}$ oz. in all cases. Kennebec produced the highest yields at both locations, with B69-16 and 47156 next best in yields at location 1. B69-16 and 47156 were generally higher in dry matter. 47156, a yellow flesh variety, is of interest because of its favorable dry matter content and because it was found to recondition well for potato chip production.

Conn. table 1.--Yield^{1/} and specific gravity of potato varieties and seedlings, Wapping,^{2/} Conn., 1959.

Variety or ^{3/} seedling (spacing 9" except *)	Total yield per acre	Yield per acre, over 1-7/8"				
				Free of serious off shape ^{4/}		Dry matter ^{5/}
		Cwt.	Pct.	Cwt.	Pct.	Pct.
Delus (6")	344		93.7	322	93.7	20.3
Huron (12")* ^{6/}	246		75.2	185	68.1	17.2
Katahdin	293		88.0	258	88.0	16.7
Katahdin x-free	354		90.2	319	90.2	16.4
Katahdin weak x	316		86.8	274	86.8	16.8
Katahdin (late mat.)	308		88.5	273	88.5	16.9
Kennebec (8")	507		94.7	480	94.1	19.1
Knik	382		79.4	303	79.4	17.3
Manota	331		93.3	309	93.3	17.4
Plymouth	285		93.0	265	91.2	16.9
47156	414		90.8	376	90.8	18.9
13-23	355		85.4	303	85.4	17.6
LS.D. 5%						20.3

Continued

Conn. table 1 continued.

Variety or ^{3/} seedling (spacing 9" except *)	Total yield per acre	Yield per acre, over 1-7/8"				
		Free of serious off shape ^{4/}				Dry matter ^{5/}
		Cwt.	Pct.	Cwt.	Pct.	
<u>Single Plots:</u> ^{7/}						
B69-16	486	94.1	457	94.1	457	19.6
B2187-25	324	89.5	290	89.5	290	16.7
B3319-30	476	81.6	388	68.6	327	17.1
B3427-7	167	76.8	128	76.8	128	16.8
B3457-2	231	58.6	135	58.6	135	19.2
B3696-13	329	92.7	305	92.7	305	18.1
B4159-2	218	74.9	163	74.9	163	17.5

1/ Plots: 1 row 21 feet long. Replication: First 12 above replicated 4 times in randomized blocks (3 sections x 4 rows). No sprayer wheel damage.

Soil: Hartford fine sandy loam, previously in shade tobacco.

Fertilizer: 2200 pounds 6-8-8.

2/ Season and conditions: Wapping - 8 miles N.E. of Hartford. Planted 4/ /59. Heavy aphid infestation damage mid-August before newer insecticide used. Section I damaged more. Considerable stalk rot. On 9/2--Sect. 2-4, Knik, 47156 and 13-23, 90% green; Delus and Kennebec, 70%; Huron 50%, Katahdin 40%, Manota and Plymouth 20% green.

3/ Seed supplied by USDA except Katahdin x-free, Katahdin weak x, and Katahdin late-maturing by Maine Experiment Station; and Huron from Canada, and 13-23 from a New York grower.

4/ Tuber observation--Manota - good shape, some sprouts (1/8") by 11/27; Plymouth - russetty skin, some irregular; 47156 - slightly irregular; 13-23 -irregular.

5/ Dry matter calculated from specific gravity. Sp. gr. by weight in air and in water. Ave. of 4 replications (10 tubers 2 1/2" to 3" diam. per sample). Sp. Gr. 1.080 = 20.2% dry matter; 1.070 = 18.1%; 1.060 = 16%.

6/ Huron had about 30-35% leafroll.

7/ Single plot observations, 1 row 21 feet.

Conn. table 2.--Yield^{1/} and specific gravity of potato varieties and seedlings, Somers,^{2/} Conn., 1959.

Variety or ^{3/} seedling (spacing 9" except *)	Yield per acre, over 1-7/8"					
	Total yield per acre	Free of serious off shape ^{4/}				Dry matter ^{5/}
		Pct.	Cwt.	Pct.	Cwt.	
Delus (6")*	264	95.5	252	95.5	252	18.2
Huron (12")* ^{6/}	342	89.8	307	87.4	299 ^{6/}	17.1
Katahdin	307	96.2	295	96.2	295	15.4
Katahdin x-free	366	97.1	355	97.1	355	15.4
Katahdin weak x	340	96.5	328	96.5	328	15.0
Katahdin (late m.)	277	97.2	269	97.2	269	15.4
Kennebec (8")*	428	95.8	410	95.2	407	16.4
Knik	340	88.1	300	88.1	300	16.1
Manota	351	93.2	327	93.2	327	16.0
Plymouth	289	94.6	273	89.3	258	16.1
47156	278	95.9	267	92.2	256	17.3
13-23	260	88.8	231	88.8	231	15.5

Single Plots:^{7/}

B69-16	328	97.2	319	97.2	319	18.2
B2187-25	312	95.5	298	95.5	298	15.0
B3319-30	442	92.6	409	81.5	360	16.3
B3427-7	169	77.3	131	77.3	131	14.4
B3696-13	291	90.4	263	90.4	263	16.9
B4159-2	258	87.1	225	87.1	225	17.1

1/ Plots: 1 row 21 feet long. Replication: First 12 above replicated 4 times in randomized blocks (3 sections x 4 rows). No sprayer wheel damage. Soil: Enfield fine sandy loam, potatoes several years. Fertilizer: 2000 pounds 8-12-12 in row, plus 40 pounds N sidedress, per acre.

2/ Season and conditions: (Somers 20 miles N.E. of Hartford.) Planted May 18, 1959. Excessively heavy showers in early and mid-September. Excellent insect control. Some stalk rot. On 9/11/59--47156, 90% green; Knik 60%; Katahdin 50%; Kennebec and Plymouth practically all dead; Manota dead; 9/24/59 about all dead except 47156.

3/ Seed supplied by USDA, except Katahdin x-free, Katahdin weak x, and Katahdin late-maturing by Maine Experiment Station; and Huron from Canada.

4/ Tuber observations--Huron - some irregular in shape; 13-23--some slightly irregular.

5/, 6/ and 7/ Same as footnotes for table 1.

DELAWARE
E. P. Brasher

The potato work in Delaware consisted of four separate studies: Yield and Solids Tests of Varieties, Size and Shape of Seedpieces, Spacing Trials and Evaluation of Hormones.

The experimental conditions and procedures for these studies were as follows: location, Substation Farm, Georgetown; soil, Norfolk sandy loam; previous crop, wheat; plot design, randomized block; fertilizer, 2,000 pounds of 10-10-10 per acre in bands at planting time; irrigation, when soil moisture dropped to 50 per cent available; fungicide, Zineb; insecticide, DDT; growing conditions, good. Three-row plots were employed in the seedpiece and spacing studies while only single rows were used in the variety trials and hormone study. The plots in all studies were 24 feet long. The seedpieces were planted 8 inches apart in all trials except the spacing.

Yield and Solids Tests of Varieties, Strains and Seedlings

Fourteen varieties and strains were tested. The results are shown in Delaware table 1.

Delaware table 1. Yield and solids tests of varieties, strains and seedlings, Georgetown, Delaware, 1959.

Variety	Seed Source	Yield per acre		U.S.No.1	Solids
		U.S.No.1	Total		
		Cwt.	Cwt.	Pct.	Pct.
B 2368-4	USDA	368	407	90	13.5
Onaway	"	356	420	85	12.1
Pungo	"	303	353	86	14.3
Katahdin	"	299	323	93	12.6
Huron	"	266	338	79	13.3
Delus	Eastern States	247	263	94	15.5
Delus	USDA	202	219	92	14.8
B 3556-11	"	195	224	87	15.5
B 3095-18	"	160	195	82	13.8
Delus	Home-grown, early	157	170	92	14.5
Delus	Home-grown, late	149	164	91	15.2
B 3453-2	USDA	142	229	62	13.3
CS 13178 (Navajo)	"	142	174	82	14.5
B 73-3	"	110	209	53	16.0
LSD 5%		40	40	--	0.70
LSD 1%		52	53	--	0.93

In yielding ability B 2368-4, a red skin variety, and Onaway were particularly outstanding. These varieties were significantly more productive than all other varieties in the trial. Among the strains of Delus, the one from Eastern States was the most productive. B 73-3, Delus and B 3556-11 contained the highest solids.

Size and Shape of Delus Seedpieces

In this study, tubers varying in size from 2 to 8 ounces (+ or -5 gms.) were halved, quartered, or cut into 8 pieces exposing one, two, or three cut surfaces on each seedpiece. The yields produced from these seedpieces are compared with those from whole 2-ounce tubers in Delaware table 2.

Delaware table 2. Effect of size and shape of Delus seedpieces on yield.

Treatments	Yield per acre		U.S. No. 1
	U.S. No. 1	Total	
	Cwt.	Cwt.	Pct.
3/4-oz. pieces cut from 3-oz. potatoes	203	229	85
1-oz. pieces cut from 2-oz. potatoes	224	252	89
1 1/2-oz. pieces cut from 3-oz. potatoes	213	237	90
1-oz. pieces cut from 4-oz. potatoes	198	234	85
2-oz. pieces cut from 4-oz. potatoes	233	262	89
1 1/2-oz. pieces cut from 6-oz. potatoes	222	249	89
3-oz. pieces cut from 6-oz. potatoes	265	307	86
1-oz. pieces cut from 8-oz. potatoes	161	189	85
2-oz. pieces cut from 8-oz. potatoes	234	277	84
2-oz. whole potatoes	254	273	93
LSD 5%	30	30	--
LSD 1%	41	41	--

Spacing Trials

Four different planting distances in the row were employed: 4, 6, 8, and 10 inches apart. The results from this study are shown in Delaware table 3 and indicate that the 8-inch spacing was the most economical. Although the average tuber weight was less in the close spacings, the differences were not statistically significant.

Delaware table 3. Effect of different spacings on the yield and tuber size of Delus potatoes.

Spacing	U.S. No. 1		U.S. No. 1	Average wt. per potato
	Cwt.	Total	Pct.	Lbs.
3 ft. x 4 in.	264	292	90	0.35
3 ft. x 6 in.	269	296	90	0.41
3 ft. x 8 in.	250	284	88	0.49
3 ft. x 10 in.	195	224	87	0.44
LSD 5%	28	28	--	N.S.
LSD 1%	35	35	--	

Evaluation of Hormones

Foliar application of several different hormones were sprayed on Delus potato plants to the point of run off. The hormones, concentration, time of application and results are shown in Delaware table 4. Significant yield increases of U. S. No. 1 potatoes were obtained from the use of N-meta-tolylphthalamic acid, indole-3-acetic acid, gibberellic acid and 2,4,5-trichlorophenoxyacetic acid. Two of these compounds significantly reduced the total solids in the tubers.

Delaware table 4. Effect of certain hormones on the yield and solid content of Delus potatoes.

Treatment	Yield per acre		U.S.No.1 Pct.	Solids Pct.
	U.S.No.1	Total		
	Cwt.	Cwt.		
Check	174	194	90	15.3
N-meta-tolylphthalamic acid, 500 ppm in bud stage	199	228	87	14.8
N-meta-tolylphthalamic acid, 500 ppm full bloom stage	174	188	93	15.0
Indole-3-acetic acid, 50 ppm in bud stage	185	204	91	14.8
Indole-3-acetic acid, 50 ppm in bud stage plus 50 ppm three weeks later	208	215	97	15.2
Para-chlorophenoxyacetic acid, 15 ppm in bud stage.	171	190	90	15.0
Para-chlorophenoxyacetic acid, 15 ppm in bud stage plus 15 ppm three weeks later	197	210	94	15.0
2,4,5-trichlorophenoxyacetic acid, 50 ppm three weeks after full bloom	200	214	93	14.3
Gibberellic acid, 15 ppm in bud stage	228	240	95	14.8
Indole-3-acetic acid, 50 ppm three weeks after bud stage	192	209	92	14.3
LSD 5%	25	25	--	0.6
LSD 1%	32	34	--	0.8

FLORIDA
(Hastings)

A. H. Eddins

Resistance of Potato Varieties and Seedling Selections
to Corky Ringspot

The reaction of 13 USDA potato seedling selections and 13 varieties to corky ringspot was determined by growing them in soil infected with the causal virus, PCRV and the results are given in Florida table 1. No symptoms of corky ringspot appeared in tubers of seedlings B 294-65, B 606-3, TL 1859 and B 3725-1 and in those of Delus, Merrimack, Plymouth, Pungo, Saco and Eigenheimer; while 27 to 38 percent of the tubers of the susceptible varieties Sebago, Kennebec, Red Pontiac and Cherokee were affected with the disease. Seedlings and varieties showing no corky ringspot infection in 1959 are the ones which developed little or none of the disease in past years.

Florida table 1. Reaction of potato seedling selections and varieties to corky ringspot when grown in replicated plots of infested soil in 1959.^{1/}

Variety or selection	Tubers			
	Number	Percent Infected	Pounds	Percent Infected
B 294-65	129	none	19.0	none
B 313-21	148	4.7	24.4	4.1
B 381-2	159	6.9	18.4	10.3
B 595-76	165	13.3	25.6	17.6
B 606-3	152	none	26.0	none
B 721-1	144	1.4	24.9	2.0
B 962-9	192	0.5	28.8	0.7
B 3010-4	194	17.0	39.4	22.6
La 1859	245	none	43.1	none
B 3725-1	207	none	31.8	none
B 3602-4	198	13.1	37.0	13.2
B 3692-4	225	12.9	44.3	14.2
B 3677-1	106	4.7	19.6	4.1
Boone	95	41.0	18.0	42.2
Cherokee	226	36.3	47.1	38.2
Delus	58	none	8.6	none
Kennebec	188	24.5	34.3	30.6
Merrimack	69	none	8.8	none
Plymouth	203	none	39.0	none
Pungo	226	none	48.1	none
Red Pontiac	317	23.3	63.8	27.0
Red LaSoda	269	21.2	55.8	22.6
Saco	209	none	39.5	none
Sebago	223	28.3	44.9	33.2
Eigenheimer	118	none	14.7	none
White Rose	251	0.4	45.3	0.7

^{1/} Potatoes planted 12-30-58 in 16-hill plots replicated 5 times. Tubers dug and examined for corky ringspot symptoms April 27 and 28, 1959

Potato Variety and Seedling Selection Trials in 1959

E. N. McCubbin and A. H. Eddins

Replicated Variety Yield Test. In 1959, 11 named varieties and 15 seedling selections were grown and compared for yield and desirable tuber characteristics at the Potato Investigations Laboratory. Seed of most of these varieties and selections were obtained from A. E. Schark, Presque Isle, Maine; R. V. Akeley, Beltsville, Maryland; and T. P. Dykstra, Baton Rouge, Louisiana; all working in the National Potato-Breeding Program. Fundy, a Canadian development, was obtained locally from a potato growers' organization.

Experimental: location, Hastings, Florida; soil, Bladen fine sandy loam; plot size, single rows 12 feet long and 40 inches apart; plot design, randomized block; planting date, January 9, 1959; fertilizer, 2,400 pounds of 7-9-9 per acre applied in bands; fungicide, Parzate; insecticides, DDT and Parathion as needed; harvest date, May 5, 1959 - 116 days after planting.

The growing season was normally favorable except for leaching rains during mid-March.

Nine potato varieties and seedling selections outyielded Sebago, the standard variety at Hastings, but only one of them, B 2368-4, significantly so, Florida table 2. Four of the higher-yielding selections were red ones, namely B 2368-4, B 2368-13, Red Pontiac and Red LaSoda. Red color of B 2368-13 was very pale; while that of the other three selections was dark red. Five other selections, tending to outyield Sebago, produced white tubers. Pungo, a high yielder, is resistant to PCRV as shown in the above section of these reports and is recommended at Hastings in place of Sebago where the soil is infested with this virus. Fundy, the Canadian development, produced high yields and its tubers were very smooth.

Recovery from freeze damage. Most of the potato variety and seedling selections grown in the replicated variety trial were included in this test. Other varieties and seedling selections also were tested for recovery from freeze damage.

This test was conducted much the same way as was the replicated yield test in the above section, except that only 8, two-ounce seedpieces of each variety or selection were used and they were planted December 10, 1958. The 8 seedpieces were planted in the row and followed by those of the next selection. The weather was cold after this planting was made. The seed was slow germinating and when the sprouts reached the soil surface they were frozen off. The plants in this test finally came up to a stand at the normal time for potatoes in this area, usually planted early in January. Thus, the below ground stems of these plants were branched where they had been frozen-off by frost (Florida table 3).

In this test, 25 varieties and seedling selections recovered from the freeze damage and produced 1 pound or more of potatoes per hill. The highest yielders were B 605-10, 2988, Pungo and B 2368-4.

These results continue to show, as did those obtained in 1957 and 1958, that potato varieties and seedlings do possess considerable ability or inability to recover from freeze damage and produce a crop of potatoes.

Florida table 2. Percent stand and yields of 26 potato varieties and selections grown at Hastings, Florida in 1959. Planted January 9, 1959.^{1/}

Variety or selection	Stand ^{2/} Pct.	100-lb. sacks per acre		
		US 1A	US 1B	Total US 1A + US 1B
B 2368-4	100	253.6	29.3	282.9
Pungo	100	234.9	27.1	262.0
B 2368-13	100	227.1	22.9	250.0
Red Pontiac	100	222.3	33.8	256.1
Fundy	98	196.9	29.6	226.5
Cherokee	98	185.2	33.8	219.0
Red LaSoda	85	182.1	41.3	223.4
Wc 41956	100	175.8	52.8	228.6
Plymouth	98	173.1	24.7	197.8
B 606-3	100	172.8	42.5	215.3
Sebago	100	172.5	41.0	213.5
B 3677-1	89	170.4	28.4	198.8
B 929-23	98	168.0	51.3	219.3
6536	94	161.0	29.3	190.3
B 3692-4	100	159.5	55.5	215.0
Saco	95	155.3	39.8	195.1
Tawa	98	151.1	51.3	202.4
B 3010-4	100	141.4	43.4	184.8
B 3602-4	100	131.8	52.8	184.6
B 313-21	45	122.4	21.7	144.1
B 2938-22	100	122.1	38.3	160.4
Merrimack	52	91.7	27.7	119.4
B 3725-1	49	83.5	38.0	121.5
6445	92	79.9	27.1	107.0
Delus	14	51.9	34.7	86.6
B 355-35	17	38.0	31.4	69.4
L.S.D. 19:1		50.2	42.9	52.6
99:1		66.4	56.8	69.6

^{1/} Based on yields of 8.6-foot single row plots replicated 5 times; seedpieces planted 8 inches apart in rows 40 inches apart. Dug 5-5-59-116 days after planting.

^{2/} Stand counts made 2-17-59, 39 days after planting.

Florida table 3. Recovery from frost injury, yield and tuber surface color of 52 potato varieties and seedling selections grown at Hastings, Florida in 1958-1959. Planted 12-10-58.^{1/}

Variety or selection	Stems No.	Stems Branched ^{2/} Pct.	Hills Dug No.	Pounds	Tubers	Tuber	Remarks
				per hill	per hill	surface color	
B 605-10	15	33.3	8	1.39	5.75	W	Good
2988	22	31.8	8	1.36	7.00	W	Fair
Pungo	29	37.9	8	1.34	5.13	W	Good (sl. rough)
B 2368-4	23	39.1	8	1.30	6.75	R	Deep Red

continued

Florida table 3, continued.

B 3677-1	17	17.6	8	1.23	6.38	W	Good
B 3725-1	9	-	8	1.20	5.75	W	Good (sl. rough)
B 3602-4	19	31.6	8	1.20	7.00	W	Smooth, good
B 3010-4	28	17.9	8	1.20	7.13	W	Fair
B 2938-22	26	26.9	8	1.18	7.25	W	Fair
B 4160-1	36	8.3	8	1.16	6.88	W	Dark
B 3692-4	27	25.9	8	1.16	6.63	W	Fair
B 355-35	8	-	8	1.15	5.63	W	Good
B 2368-13	21	33.3	8	1.15	5.75	R pale	Poor
B 606-3	17	29.4	8	1.14	7.00	W	Smooth
B 3428-41	14	14.2	8	1.11	6.50	W	Fair
6937	23	26.1	8	1.10	5.88	W	Good
B 3428-20	28	7.1	8	1.08	6.75	W	Poor
B 3626-13	25	28.0	8	1.04	6.63	W	Smooth, good
B 3726-6	18	16.7	8	1.04	6.25	W	Russet, poor
Cherokee	15	40.0	8	1.04	6.00	W	Smooth, good
Tawa	14	14.2	8	1.03	4.50	W	Good
Wc 41956	39	25.6	8	1.01	7.25	W	Fair
6609	33	18.2	8	1.01	6.75	R	Dark red, good
Saco	16	50.0	8	1.00	6.38	W	Smooth, good
Ia 1084-1	17	29.4	8	1.00	5.50	R	Deep red, fair
CS 13091	29	20.7	8	.95	7.58	W	Cracks
CS 11888	19	31.6	8	.96	5.25	W	Russet, good
B 2874-4	16	6.3	8	.95	6.00	R	Light red, poor
B 3428-31	25	24.0	8	.90	6.75	W	Poor
B 2187-25	25	44.0	8	.83	5.00	W	Blocky
B 3299-13	11	18.2	8	.81	4.38	W	Fair
Merrimack	10	-	8	.75	4.63	W	Smooth, fair
Kennebec	11	18.2	8	.71	4.75	W	Only fair
Plymouth	9	22.2	8	.71	3.50	W	Low yield
Sebago	19	52.6	8	.71	5.88	W	Small, good
B 3114-52	14	28.6	8	.70	4.63	W	Smooth
Red Pontiac	12	16.7	8	.70	4.50	R	Good
Red LaSoda	11	18.2	8	.70	4.63	R	Dark red
B 3428-41	11	9.1	6	.68	3.50	W	Shouldered
Ia 1092-2	10	40.0	8	.68	5.00	W	Poor
B 3401-25	8	-	8	.68	4.00	W	Fair
CS 11889	17	17.6	8	.61	3.88	W	Only fair
B 2162-36	11	-	8	.60	3.88	R	Poor
B 2971-14	15	33.3	8	.56	3.75	W	Poor
B 929-23	31	29.0	8	.55	4.88	W	Poor
B 3556-12	32	37.5	8	.50	4.13	W	Poor
B 2894-24	10	20.0	8	.49	4.00	W	Poor
B 4094-21	9	-	8	.46	2.25	Rus	Poor
Delus	8	-	8	.41	2.88	W	Poor
B 313-21	8	-	8	.38	2.63	W	Poor
B 4093-18	8	-	8	.36	2.50	Rus	Poor
6003	21	33.3	8	.34	3.13	W	Poor

1/ Based on yields from 8 2-ounce seedpieces planted 1 foot apart in rows 40 inches apart.

2/ Frost occurred several times when plants were at the soil surface. Branching of stems caused by frost to plant stems at the soil surface.

GEORGIA
J. E. Bailey

In 1959, cooperative potato yield trials with U.S.D.A. were conducted in the mountain area of Georgia. The selections were planted April 6 and harvested July 30 - 31. Rainfall from planting to harvesting was 20.1 inches. Fertilizer (4-12-12) was applied at the rate of 1,000 pounds per acre. Four replications of each selection were planted in 25-foot rows (25 seedpieces spaced at 12 inches) and the distance between rows was 39 inches. Seedpiece germination was 100 percent. The results are presented in Georgia table 1.

Georgia table 1. Potato variety test, Blairsville, Georgia, 1959.

Variety	U.S. No. 1 Bu.	Yield per acre		Total Bu.
		U.S. No. 2 Bu.	Culls Bu.	
B 73-3	322.6	17.9	3.0	343.5
B 605-10	448.0	17.9	4.5	470.4
Plymouth	382.3	9.0	4.5	395.8
Cherokee	437.5	25.4	7.5	470.4
Boone	304.6	28.4	10.5	343.5
Kennebec	461.4	29.9	9.0	500.3
Merrimack	361.4	14.9	4.5	380.8
Saco	497.3	22.0	9.0	528.3
Pungo	424.1	10.5	4.5	439.1
Tawa	307.6	23.9	14.4	345.9
Rushmore	277.8	14.9	7.5	300.2
Onaway	413.7	16.4	8.2	438.3
Chippewa	379.3	22.4	6.0	407.7
Red Beauty	290.5	34.3	11.9	336.7
La 1859	448.0	26.9	10.5	485.4
Manota	371.8	28.4	7.5	407.7
Redburt	402.5	22.4	9.0	433.9
50B9-8	362.9	19.4	9.0	391.3
Bliss <u>1/</u>	377.8	25.4	9.7	412.9
Cobbler <u>1/</u>	412.2	38.8	12.7	463.7
Sequoia <u>1/</u>	379.3	22.4	9.0	410.7

1/ These 3 varieties were added in the tests for Station information.

IDAHO (Aberdeen)

W. M. Iritani and D. R. Bienz

Potato Variety Trials

With the advent of vast expansion of the processing industry in Idaho, requirements of a potato variety have changed somewhat. Whereas, formerly most of the potatoes grown in Idaho were sold on the fresh market and therefore had to have a russet appearance since this was synonymous with Idaho potatoes, now over 40 percent of the potatoes produced in Idaho are being processed and it is envisaged that within the next ten years approximately 70 percent of the crop in Idaho will be processed. With this in mind, the breeding program and the testing of varieties are being geared more towards the needs of the processing industry. Some of the requirements expressed by processors are: high dry matter content, low reducing sugar content, narrow range in specific gravity, narrow size distribution, resistance to bruising and injury, and the ability to store well. These and other desirable characteristics will be incorporated into the testing program as they come along.

The trial carried out in 1959 consisted of four selection from the U.S.D.A. Western Regional Potato-Breeding Program and five varieties. These were planted on May 16 in a field which previously had alfalfa. The plots were 35 feet long, 3 feet in width, with hills spaced 10 inches apart. They were replicated 7 times in a randomized complete block design. At the time of planting the plots were side dressed with 300 pounds per acre of 16:20:0. Stand counts were taken on June 24 and "early dying" readings on August 28. Harvesting was conducted on October 5. A good rain was obtained one week previous, which made the soil conditions excellent for harvesting operations. Performance of the four seedlings and five varieties is shown in Idaho table 1. All statistical comparisons are made with the Russet Burbank potato as the check since theoretically any new variety will have to replace Russet Burbank in commercial production.

Approximately 60 pounds of each of these varieties were sent to three different commercial processors to have them evaluated for processing qualities. The results were not available at the time of this writing. Specific gravity ranges were determined by the brine method. Five brine solutions were used to divide approximately 75 pounds of No. 1 potatoes into 6 categories.

Results. According to Idaho table 1, there was no statistical difference in total yield between Russet Burbank and the other varieties although seedling A 175-7 produced an average of 34 sacks per acre more potatoes. This lack of statistical difference is attributed to high field variation which was not taken out by replication. However, A 175-7 and Kennebec yielded significantly more U.S. No. 1's than Russet Burbank. In percent U. S. No. 1's, A 175-7, Menominee and Kennebec yielded significantly more than Russet Burbank at odds of 95:1. On the contrary, the same varieties produced significantly less small tubers than Russet Burbank. Seedling A 177-54, which is cream fleshed and A 170-9 produced significantly more malformed tubers. Early Gem had a high number of tubers with growth cracks. This is attributed to the late digging of Early Gem which is an early maturing variety. A 175-7, A 180-24 and Blanca had highly significantly less stand count than Russet Burbank. Blanca, A 170-9 and Menominee had significantly lower "early dying" (verticillium) reading, while Early Gem had significantly higher readings. This reading was no doubt confounded with earliness. It is difficult to separate the dying of the foliage due to earliness and pre-mature dying, due to Verticillium.

Idaho table 1. Performance of varieties in 1959, Aberdeen, Idaho.

Variety	Total Cwt.	No.1's Cwt.	No.1's Pct.	Small tubers Pct.	Malformed Pct.	Growth cracks Cwt.	Ave. Stand Pct.	Early Dying Readings ^{1/} Pct.
A 175-7	328	258*	77.5*	10.8**	7.5	6.6	33.8**	9.6
A 177-54	274	145	51.0	29.7	14.3	2.5	35.0	11.0
A 180-24	258	133	51.0	33.5	5.7	21.9	32.3**	21.6
Blanca	264	168	61.6	30.7	3.8	9.9	33.7**	8.1
A 170-9	322	165	51.5	19.6**	19.6**	30.2	37.0	6.7*
R. Burbank	294	173	58.4	31.4*	5.8	0.8	37.7	15.4**
Menominee	297	227	76.6	15.6*	6.0	4.1	35.6	3.7**
Early Gem	272	168	62.1	19.4	2.9	42.2	36.7	92.4**
Kennebec	324	245*	75.9*	14.6*	7.5	6.6	34.1*	16.1
L.S.D. 1% N.S.		89.4	19.8	20.3	7.39	--	3.75	9.35
L.S.D. 5% N.S.		67.1	14.8	15.2	5.54	--	2.81	7.01

^{1/} These readings are taken as percent dead foliage between 0 percent and 100 percent.

* Significantly different from Russet Burbank at 5 percent level.

** Significantly different from Russet Burbank at 1 percent level.

table

In Idaho/2 are shown the specific gravity distributions in percent of approximately 75 pounds of potatoes for the seedlings and varieties in the trial. The processors in this area have expressed a desire for a variety which has a fairly high dry matter content with a narrow distribution range. Seedling A 175-7 which outperformed Russet Burbank the last two years both in yield and dry matter content, also appears to have equally as good solids distribution. Seedlings A 177-54, A 170-9, Menominee and Kennebec all have higher dry matter contents than Russet Burbank, however, they also tend to have wider distribution of solids. Early Gem exhibited very low specific gravity.

Idaho table 3 shows 4 years' data on testing of seedlings in a replicated trial with other varieties. The comparisons are made only with Russet Burbank. Seedling A 170-9 had higher specific gravity for three years than Russet Burbank. However, it yielded much lower No. 1's and also had a tendency to produce many rough tubers. Possibly under different cultural conditions it may out-produce Russet Burbank. Seedling A 175-7 had a higher specific gravity than Russet Burbank for the seasons 1958 and 1959. However, for the 1957 season it had very low dry matter content which is unexplainable. It consistently yielded a very high percentage and amount of No. 1 tubers. Seedling A 177-54 is a cream-fleshed seedling which was included in the 1959 trials after learning that the color would not be objectionable for some processed products. It had a very high dry matter content, although the yield was not especially good. A 180-26 had good dry matter content for the three years it was tested, however, it was rated very low in appearance and shape by the Potato Selection Committee. A 180-24 had lower dry matter content than Russet Burbank during the two years it was tested. The Potato Selection Committee which meets every year at Aberdeen to evaluate seedlings from

the breeding program decided to discard the last two as not worthy of further consideration.

There did not appear to be any significant amount of leafroll in any of the varieties when readings were taken on August 28. However, Kennebec was infected with some scab and rhizoctonia on the tubers at the time of harvest. There was also a slight amount of scab on Blanca.

Idaho table 2. Specific gravity distribution (percent of approximately 75 pounds U. S. No. 1's of each variety). 1959.

Specific gravity range	A 175-7	A 177-54	A 180-24	Blanca	A 170-9	Russet Burbank	Menominee	Early Gem	Kennebec
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
>1.075	4.9	0.7	15.0	5.0	2.4	5.6	4.2	55.9	5.1
1.075 - 1.080	5.8	1.0	16.4	3.3	6.3	7.7	3.2	22.1	4.7
1.080 - 1.085	26.4	10.6	44.3	16.6	28.9	29.8	16.9	17.6	18.7
1.085 - 1.090	34.8	31.7	20.2	21.6	29.4	35.9	34.6	3.7	23.8
1.090 - 1.095	22.2	32.7	4.1	25.9	18.7	17.2	17.2	0.5	29.9
<1.095	5.8	21.5	0.0	27.5	15.1	3.7	23.8	0.0	17.9
Average specific gravity	1.086	1.090	1.081	1.089	1.087	1.085	1.088	1.076	1.087

Idaho table 3. Performance of various seedlings in comparison to Russet Burbank potatoes, 1959.

Seedling	1956		1957		1958		1959	
	Yield No. 1's	Specific gravity	Yield No. 1's	Specific gravity	Yield No. 1's	Specific gravity	Yield No. 1's	Specific gravity
	Cwt/A.		Cwt/A.		Cwt/A.		Cwt/A.	
R. Burbank	194.2	1.090	173	1.084	71	1.083	173	1.085
A 170-9	185.6	1.084	105	1.088	42	1.085	165	1.087
A 175-7	---	---	241	1.076	213	1.085	258	1.086
A 177-54	---	---	---	---	---	---	145	1.090
A 180-26	168.7	1.084	119	1.083	140	1.085	---	---
A 180-24	---	---	---	---	151	1.078	133	1.081

IOWA

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The potato improvement projects in Iowa are conducted cooperatively between the U. S. Department of Agriculture and the Iowa Agricultural Experiment Station. This work includes breeding, disease study and insect study phases. In the Iowa Agricultural Experiment Station these phases of the program are done cooperatively between the Departments of Horticulture, Plant Pathology, and Entomology.

Seed and Seedling Production. Parents were selected for crosses on a basis of: High yields, high quality (interior color, high solids, texture, etc.), scab resistance, other disease resistance including late blight, virus X, leafroll, verticillium wilt, ring rot, virus A, and virus Y. Seed production was excellent and a total of 281 combinations were made. About 21,000 seedlings were grown at Clear Lake and from these, about 291 single hills were selected for further testing. The Cobbler crosses looked exceptionally good this year.

Increase Plots. The increase plots were grown at Rhinelander, Wisconsin in cooperation with Starks Farms. A total of 680 lines were planted and after rigorous selection, 181 lines were harvested. Each of the 181 lines and this year's single-hill selections are being indexed at Homestead, Florida. Any tuber that is questionable will be discarded. This procedure is necessary so disease-free stock can be maintained.

In 1958 the increase plots were grown in Ames, and apparently due to a large insect population, we found a considerable amount of leafroll in the material. This was indicated by the Florida index program. All tubers showing symptoms of leafroll, as well as other diseases, were discarded and the remaining stock of the increase was also discarded. Only leafroll-free tubers, as indicated from the index, were planted in the 1959 increase plots and only a few plants showed leafroll symptoms. These plants were rogued.

Results of the Florida index program indicate we have eliminated spindle tuber and other viruses from our stock. We hope to continue this program to maintain this virus-free condition.

3-Hill Test. Early generation material is planted in this test. These are observed for various characteristics including vine type, vigor, maturity, general appearance, specific gravity, scab resistance, internal defects, external defects, and flesh color and texture. Many selections are discarded in this test. There were 458 entries in 1959 and of this number 67 were selected for further testing in the 25-hill test. This amounts to about an 85% reduction.

Iowa Yield Trials. Due to leafroll in the increase stock of 1958, no yield trials were planted at Clear Lake.

North Central Yield Trial-Iowa. These trials represent the best advanced lines from the North Central States. Similar tests were duplicated at eleven locations and the results in Iowa are included in the North Central Regional Trials for 1959 (see index).

Two lines, Bounty and La 42-45, were outstanding in yield, both above Red Pontiac. Bounty, a Nebraska release, had little scab resistance on the peat soil. It matured slightly later than Cobbler but had solids comparable to Cobbler. La 42-45 had slightly better scab resistance on the peat and was of medium maturity with solids about equal to Cobbler. Yields in this year's test were above the average of the past few years and the amount of scab greater.

Muscatine Iowa Yield Trial. Eleven early maturing varieties and advanced selections were tested at two locations in the Muscatine, Iowa area in cooperation with Mr. Lewis E. Peterson of the Muscatine Island Field Station. The two locations were Fruitland, Iowa and the Singleton Farm. The results are given in Iowa table 1. There was considerable variation in the test so no one entry stands out.

The design used in these trials was a complete randomized block with four replications. Plot size was 44 inches x 25 feet. Fertilizer applied included 1,500 pounds of 3-9-27 per acre plowed under and 150 pounds of 33-0-0 side dressed.

Experiment to Study Heterosis in Potatoes and to Determine which of Six Tester Stocks is Superior. This is a fundamental study to investigate new methods of breeding potatoes. In many crops use has been made of tester stocks to test new inbreds for combining ability for yield.

Work on this project began in 1955 when six clones of potatoes, Katahdin, La 1859, B 962-32, ND 457-1, X 96-56, and B 3131-8, that were thought to have possibilities as testers, were crossed with 45 random clones from breeding programs of several States. A total of 190 crosses, out of a possible 270, were successful and planted in a replicated yield trial along with ten check varieties. The design used was a rectangular lattice by Dr. W. T. Federer of Cornell University. An identical experiment was planted in two locations in New York State, Dr. R. L. Plaisted cooperating.

The objective of this study is to obtain a measure of general combining ability for yield and possibly specific gravity and general tuber appearance of the six testers and 45 random clones. The analysis is not completed and figures for general combining ability have not yet been calculated.

The means over testers and random clones are given in Iowa table 2. The differences between testers, over random clones, are small, especially in reference to total weight. It appears that differences between testers are being masked by specific combining ability effects between the testers and certain random clones.

If those random lines which were crossed with each of the six testers are extracted from the entire experiment, a total of 48 crosses are involved. The data from these crosses has been analyzed to check the interaction between testers and random clones. This interaction is an indication of the magnitude of the specific combining effect. There is a significant interaction between testers and clones in total weight, but not in specific gravity or general appearance. From this it appears that for total weight, or yield, there is a great amount of specific combining effect, but with specific gravity and general appearance there is less of this effect relative to the efficiency of the experiment.

At the present time, a method is being devised to obtain a quantitative measure of general combining ability for the testers and random clones using all of the 190 crosses in the experiment. When this is done, it is hoped that the differences will be more apparent and that an effective tester stock can be selected from those tested. Once a suitable tester has been found a program of selfing and test-crossing will be followed.

Insect Resistance Studies. Plantings of potato selections were made at Ankeny, Iowa in early May to be grown without insecticide protection. Rainfall was well distributed throughout the growing season. Soil moisture conditions were considered near optimum. Rows were spaced 68 inches apart. Irish Cobbler variety was used in guard hills and to fill in unequal ranges. Infestation of the potato flea beetle, Epitrix cucumeris (Harris), began with plant emergence and persisted through the season. Susceptible selections were severely damaged. The Colorado potato beetle, Leptinotarsa decemlineata (Say), was only moderately abundant and persisted at a low intensity through the season. Susceptible selections were damaged severely only early in the season. The potato leafhopper, Empoasca fabae (Harris), was abundant. Infestations were intense from June until harvest.

Major objectives in the following experiments were to identify and characterize the components of field resistance to the potato leafhopper. These components may be either insect centered, (e.g. in the case of insect behavior which may exhibit preferential selection for the egg laying site) or plant centered (e.g. in the differential response of potato selections to the feeding of Empoasca fabae). Certain selections exhibit but little visible damage to an infestation which would destroy susceptible selections.

EXPERIMENT:

I. Single-hill segregates. Single tubers from some 2,500 pot-grown segregating F_1 seedlings of 86 crosses made in the greenhouse were planted May 4 at Ankeny. Single hills were spaced 3 feet apart in the row. All plants showing extensive hopperburn were rogued July 9; roguing was repeated August 4. At harvest, September 9, 36 segregates showing little or no hopperburn were saved. The group saved represented crosses shown in Iowa table 3.

Iowa table 1. Early Potato Yield Trial, Muscatine, Iowa, 1959.

Variety	Fruitland, Iowa		Singleton Farm	
	Total	No. 1	Total	No. 1
	yield/A	yield/A	yield/A	yield/A
	Cwt.	Cwt.	Cwt.	Cwt.
Cobbler	212	160	164	119
Triumph	205	153	167	125
Waseca	201	162	155	138
Warba	192	140	125	87
Dazoc	185	139	127	95
Norland	173	137	158	132
Kennebec	172	132	138	113
I 1426-1	156	117	-	-
I 961-1	149	100	133	97
Tawa	145	117	104	77
L.S.D. 5%	35	26	35	30
L.S.D. 1%	47	33	47	41

II. Single-hill segregates: Single tubers from some 580 pot-grown segregating F₁ seedlings of 15 crosses in which the pollen had received X-irradiation, were planted at Ankeny in single hills spaced 3 feet apart in the row. All plants showing extensive hopperburn were rogued July 9: roguing was repeated August 4. None remained at Harvest September 9.

III. Three-hill observation plots: At Clear Lake a moderately heavy flea beetle infestation developed. Differential feeding was evident. Visual ratings of feeding damage were made July 17, based on 5 relative classes, 1, least feeding to 5, greatest feeding. Since the plots were sprayed with DDT, potato leafhopper infestations were too low in intensity to permit ratings. Selections ranking 1 (least feeding) are shown in Iowa table 4.

IV. Commercial varieties: Eighteen commercial varieties procured from Starks Farms, Rhinelander, Wisconsin, were grown in single-row four-hill plots randomized in 5 complete blocks. Visual ratings of fleabeetle damage were made June 19. Ratings of potato leafhopper damage (hopperburn) were made July 6. Tuber yields were recorded. Insects were not controlled; infestation of leafhoppers were severe. Results are in Iowa table 5.

V. Selected clones: Forty clones selected to include those exhibiting both field resistance and susceptibility to leafhopper damage were planted May 2 in single-row plots 4 hills long (spaced 3 feet apart in the row). Plots were randomly placed in 4 replicated blocks each comprised of two ranges containing 20 clones. Irish Cobbler guard hills surrounded each range.

The major objectives were to sample systematically and observe variables that might contribute to field resistance and to estimate the possible significance of each in the effective resistance to insects. Methods and summary data follow.

Iowa table 2. Means over testers and lines.

Means over testers									
Random lines	Katahdin	Ia.1859	B 962-32	ND 457-1	X 96-56	B 3138-8	Total wt _g	Specific	Appear.
							per plot _{1/2}	gravity	rating _{2/2}
Ia 957-1		X	X	X		X	12.8	1.066	3.5
Ia 1015-2	X	X	X	X		X	15.6	1.062	3.7
Ia 1077-16	X	X	X			X	14.9	1.067	3.1
Ia 1077W28-5	X	X	X	X	X	X	15.9	1.067	3.9
Ia 1114-2	X	X	X	X	X	X	13.4	1.069	3.7
Early Gem	X	X	X	X	X	X	12.7	1.061	3.6
B 3196-N2	X	X	X	X		X	13.8	1.063	3.9
B 2938-22		X		X			12.1	1.062	3.1
B 2903-17		X					11.2	1.064	3.5
Ia 1188-2	X		X		X	X	14.4	1.068	3.8
B 922-3	X	X	X	X	X	X	13.7	1.061	3.7
B 922-6	X	X	X	X	X		13.9	1.064	3.8
B 2834-3	X	X	X	X		X	15.2	1.065	4.2
B 3014-10	X	X	X	X			16.8	1.064	4.1
B 3097-16		X	X	X			14.3	1.064	4.0
B 3131-N2	X	X	X	X			15.6	1.065	3.9
B 3428-31		X	X			X	12.9	1.071	3.1
B 3428-41	X	X	X	X		X	13.4	1.064	3.9
B 3556-12	X	X	X	X	X	X	12.6	1.069	3.4
PI 194655		X	X	X	X		13.4	1.069	3.0
Ia 1859	X		X	X		X	15.0	1.065	3.3
ND 457	X	X	X				14.2	1.068	4.3
OB 2905-1	X	X		X		X	13.6	1.062	3.8
PI 214372-1		X	X	X	X	X	14.0	1.069	3.7
PI 214371-2	X	X			X		12.7	1.068	2.8
PI 214372-2	X	X	X		X		13.8	1.068	3.6
Picha 51.1-53-15	X	X	X	X			15.4	1.064	3.9
Ia 1049-3	X	X			X		13.5	1.063	3.8
Ia 1092-3		X		X	X	X	15.3	1.069	4.1
Ia 1165-14	X	X	X	X	X	X	14.0	1.067	4.0
Ia 1216-1R	X	X	X	X	X		13.8	1.065	3.9
B 605-10	X	X	X		X	X	14.0	1.064	3.7

continued

Means over testers

Iowa table 2, continued.	
Random lines	Katahdin Ia. 1859
B962-32	ND457-1
X96-56	B3138-8
Total wt. per plot ¹	Specific Appear. gravity rating ²

B 2368-4	X		X	X			18.7	1.065	3.9
B 3138-4	X		X	X			14.6	1.069	3.7
B 3556-1	X		X	X	X	X	15.8	1.068	3.8
X 927-3	X		X	X	X		15.7	1.067	3.5
Ac 25953	X		X	X	X		14.3	1.068	3.2
Neb. 154-47-2					X	X	19.3	1.061	3.8
OB 3596-1		X					13.2	1.063	3.5
Earlaine	X				X	X	15.3	1.063	4.1
Katardin		X			X		17.2	1.065	4.5
Osage	X				X		14.6	1.065	4.1
Redkote		X			X		16.4	1.065	3.4
Ia 1077-14	X				X	X	11.9	1.071	3.7
B 24-58		X			X	X	13.3	1.069	3.7

-87-

1/ Pounds

2/ Rated 1-8 with 1 least desirable.

Iowa table 3. Hopperburn-resistant selections.

Pedigree	Parentage	Number of selections
AI S3025	4N Chacoense x ND 457-1	7
AI 5543	Ia 1049-3 x X 927-3	2
AI 5549	Ia 1077-14 selfed	7
AI 5554	Ia 1077-16 selfed	5
AI 5563	Ia 1077-W 28-5 x N 2903-17	3
AI 55300-1	PI 194665 x B 2834-3	1
AI 55326-1	X 927-3 x B 2368-4	1
AI 56412-1	PI 214372-1 x ND 457-1	1
AI 5522-1	Ia 872-4 x B 2903-17	1
AI 56412-1	PI 214372-1 x ND 457-1	1
AI 57355	Red Pontiac x B 2162-32	2
AI 58475	AI 5561-2 x AI 56331-1	4
AI 58476-1	Voran x AI 56331-1	1

Iowa table 4. Selections ranking 1 for fleabeetle resistance.

Pedigree	Parentage
Ia 5686-1	Ia 1114-2 x Cherokee
Ia 56278-1	41956 x La 1859
Ia 56288-12	Ac 25953 x La 1859
Ia 56319-2	OB 2905-1 x La 1859
Ia 56319-3	OB 2905-1 x La 1859
Ia 5702-3	Ia 801-10 x B 929-32
Ia 5708-1	Ia 801-10 x 1682-C
Ia 5734-3	Ia 1027-18 x La 1859
Ia 5734-4	Ia 1027-18 x La 1859
Ia 57410-20	La 1354 x Ia 1027-18

Methods of observation and sampling: Fleabeetle feeding sites present an accumulative record during the season of feeding on potato foliage. On June 16 a visual rating into 5 relative classes of feeding intensity was made. (1, least intensity, to 5, greatest intensity). The rating assigned to each plot was based on the average of two values, each independently estimated.

Potato leafhopper oviposition represents a possible point of differential leafhopper response to potato selections. By using a lactophenol technique for clearing leaf tissue it was possible to count eggs inserted into the tissues. Preliminary sampling indicated that egg deposition was fairly uniform among leaflets of individual leaves. In sampling the number of eggs deposited on the 40 clones, 6 samples per plot were taken on each date of sampling. Each sample comprised 3 terminal leaflets.

Iowa table 5. Ratings of commercial varieties.

Variety	Mean fleabeetle rating*	Mean hopperburn rating*	Pounds tubers per 20 hills
Antigo	1.6	3.8	24.2
Cobbler	4.0	3.8	42.7
Chippewa	4.6	3.4	33.8
Early Gem	2.2	2.4	32.6
Katahdin	4.8	2.8	26.9
Plymouth	1.6	2.8	34.2
Red LaSoda	4.4	2.0	31.4
Red Pontiac	4.6	4.6	35.7
Red Warba	3.2	4.0	37.8
Russet Burbank	2.2	3.0	25.2
Russet Sebago	3.2	4.0	25.2
Sebago	2.8	4.0	30.5
Tawa	4.6	3.0	17.9
Triumph	3.4	5.0	26.9
Dazoc	4.2	4.2	18.3
Osseo	4.2	3.6	34.1
Waseca	4.6	3.0	33.4
Saco	3.6	4.0	22.5

*1, least, 5, greatest damage.

The feeding nymph presents another instance of contact between the potato leafhopper and the plant whereupon differential leafhopper response might be expected. Whether the nymph remains and develops on the plant or not may be quite independent of the factors influencing egg deposition. A count was made of the total number of nymphs present on 18 leaflets per plot (6 leaflets from 3 leaves, each from a different plant).

In addition to the responses of the insect to defense mechanisms of the plant, the response of the potato plant to leafhopper infestation offers a possible instance of differential plant response which may function as one of the components of field resistance. Visual ranking of hopperburn intensity into 5 relative classes (1, least to 5, greatest damage) was done by two observers who familiarized themselves first with the range of hopperburn intensity, then independently ranked each plot. The average of the two visual ratings was recorded. The total weight of all the tubers from each plot was recorded. Results are shown in Iowa table 6.

VI. Wild tuber-bearing Solanum species: In the spring of 1959, 185 accessions including 52 known species of tuber-bearing Solanums were obtained through the courtesy of Dr. R. W. Hougas and Mr. Roman Ross of the U. S. D. A. Regional Potato Introduction Station at Sturgeon Bay, Wisconsin. Tubers of each accession were planted both at Ames and at Ankeny, Iowa, early in May. Four plants of each accession were grown at Ankeny and were not treated with any insecticide. These were rated with respect to feeding damage by the potato

flea beetle and Colorado potato beetle, and with respect to hopperburn damage resulting from feeding by the potato leafhopper. Two plants of each accession were grown at Ames and were treated weekly with a non-cholinesterase inhibitory insecticide, Endrin. Leaf tissues of these plants were harvested in late August and preserved by freezing for subsequent assays of cholinesterase inhibition, other enzyme inhibition, and alkaloid concentration. Large differences were observed in the extent of feeding upon the various *Solanum* species by the flea beetle and Colorado potato beetle. The reaction of the various *Solanum* species to leafhopper feeding also varied markedly. Differential responses were also noted between various accessions of the same species. Resistance to flea beetle or Colorado potato beetle feeding did not appear to be associated with resistance to leafhopper damage. A great amount of variation between species also was found in the concentrations of cholinesterase inhibitory substances present in the foliage. Very high concentrations were found in *S. kurtzianum*, *S. chacoense*, *S. verrucosum*, and *S. brachycarpum*. Little or no inhibitor was found in *S. berthaultii*, *S. bulbocastanum*, *S. chiquidenum*, *S. raphanifolium*, and *S. tarijense*.

In summary, the data clearly indicate that insect centered mechanisms contributing toward field resistance to insects among the tuber-bearing *Solanum*s include: (a) preferential selection by potato leafhoppers for certain strains as sites for egg laying; (b) preferential selection by Colorado potato beetles for certain potato strains for adult feeding and egg laying sites; (c) preferential selection by the potato flea beetle for certain potato strains for adult feeding sites; and (d) unidentified mechanisms.

Plant centered mechanisms contributing toward field resistance to insects include; (a) differential degree of hopperburn among *Solanum* strains in response to leafhopper feeding; and (b) unidentified mechanisms.

There was little or no evidence of differential survival of potato leafhopper nymphs on *Solanum*s selected to include a wide range in response to leafhoppers as measured by hopperburn.

Resistance to each of the species of insects under study appears to be due to independent mechanisms. Only occasionally have single potato selections shown evidence of resistance to more than one of the insects under study

Iowa table 6. Summary table of data from the observation of forty selected clones, Experiment V.

Potato selection	Mean potato flea beetle rating	Potato leafhopper eggs per 216 leaflets	Potato leafhopper nymphs per 216 leaflets	Hopper-burn rating	Pounds tubers per plot
AI 5561-4	4.75	49	41	1.00	0.2
AI 5561-11	5.00	56	35	1.00	0.3
AI 56321-3	3.75	61	82	3.00	2.1
AI 5561-16	4.75	65	95	4.25	0.5
AI 5561-13	4.25	69	31	1.25	16.0
AI 5561-12	4.75	73	63	1.00	15.1

continued

Iowa table 6, continued.

Ia 56397-1	1.75	82	193	3.00	11.5
Ia 5561-2	4.50	99	69	1.25	47.5
Ia 1416-3	3.00	101	158	2.75	11.2
Ia 1416-1	4.25	111	180	3.25	15.7
White Rose	3.00	111	249	5.00	2.2
AI 5561-5	5.00	117	166	1.25	8.9
Plymouth	2.00	117	165	3.25	10.5
Ia 1107-3	3.25	118	102	2.50	2.8
AI 5561-8	3.75	119	115	1.00	8.4
B 4257-Ia 10	3.75	121	130	1.75	38.2
Green Mountain	3.25	128	222	5.00	1.6
B 2067-52	4.00	152	208	4.00	11.4
B 3556-12	4.00	155	173	4.75	2.7
Ia 56441-1	5.00	156	210	4.50	4.5
Keswick	4.25	157	208	4.50	8.5
F 90- Ia 3	3.50	165	118	3.50	0.5
B 4257-Ia 12	4.50	166	138	3.25	3.0
Ia 898-1	3.50	170	208	4.00	2.4
B 4308-Ia 5	4.25	172	147	2.50	14.8
Cobbler	4.00	174	352	4.00	15.0
Ia 874-2	3.75	176	214	2.75	10.5
Ia 5615-3	4.25	177	273	3.75	5.9
Ia 5583-3	4.00	181	82	2.00	12.2
Ia 56372-1	3.00	184	194	3.25	2.4
Minnesota 355	3.50	187	240	4.25	5.8
CS 15-13	3.00	187	167	4.00	0.7
Ia 55238-1	4.50	195	246	4.25	10.9
B 3309-2	5.00	212	269	5.00	0.3
3 RC-8	3.00	223	213	5.00	8.2
Ia 56388-1	4.50	250	325	3.50	2.0
Huron	2.75	271	231	3.50	9.2
B 4257-11	4.75	338	331	3.25	7.8

KANSAS
J. K. Greig and others^{1/}

The yields per acre and total solids for 16 varieties tested in 5 locations are presented in Kansas table 1. The plots were sprayed when necessary to control insects and diseases. Red Warba, Red Pontiac and Cobbler seed stocks were obtained locally; Redkote and Norland from Certified Growers in North Dakota, and all other varieties from Nebraska Certified Growers, Alliance, Nebraska.

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Kansas table 1.--Potato variety trials at 5 locations in Kansas, 1959.

Variety	Manhattan		Wathena		Mound Valley		Garden City		Colby	
	U.S.		U. S.		U. S.		U. S.		U. S.	
	No. 1 Yield /Acre	Total Solids	No. 1 Yield /Acre	Total Solids	No. 1 Yield /Acre	Total solids	No. 1 Yield /Acre	Total solids	No. 1 Yield /Acre	Total solids
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Bounty	375	15.7	250	18.2	98	15.3	251	18.2	333	16.9
Red Pontiac	360	13.8	225	15.3	94	14.7	252	15.7	362	14.1
I. Cobbler	357	18.1	280	20.4	78	17.2	288	18.9	316	18.2
Dazoc	345	17.5	174	18.2	62	17.7	241	18.2	238	17.7
Haig	337	17.4	159	18.4	78	16.7	222	18.6	226	16.3
Red LaSoda	330	14.7	249	17.2	77	14.3	237	16.3	290	14.9
Red Warba	315	17.2	233	18.4	96	18.2	183	16.5	217	16.7
Redbake	296	18.4	212	19.1	62	16.0	210	18.4	220	18.0
Norland	304	15.1	188	15.7	60	16.0	222	16.0	197	14.9
Redkote	272	14.5	185	16.3	74	14.5	141	16.3	155	14.5
Kennebec	278	16.0	251	18.6	81	15.6	147	18.2	248	16.0
Tawa	282	17.4	198	18.6	74	17.4	162	18.0	190	16.7
Excel	267	19.1	232	21.6	80	19.1	209	20.4	256	18.4
Plymouth	259	18.0	176	19.1	80	17.2	187	18.2	214	16.9
Early Gem	250	14.5	181	15.3	46	14.0	292	16.5	199	15.6
Boone	158	13.8	218	16.9	82	14.9	85	15.6	170	14.5
L.S.D. 5%	62	0.6	44		14	0.6	68			
Planted:	March 17		April 6		March 16		March 28		March 31	
Harvested:	July 29		August 2		July 10		August 20		August 25	
Irrigations:	2						9		10	
Fert./A: N	114	lb.	30	lb.	16	lb.	26	lb.	29	lb.
P ₂ O ₅	355	lb.	60	lb.	18	lb.	78	lb.	58	lb.
K ₂ O	0		30	lb.	16	lb.	0		0	

KENTUCKY
D. J. Cotter

The crop was planted on April 8. Weather following planting was normal in temperature and moisture. An extended period of dry weather occurred during June and July. These conditions resulted in smooth, bright skinned, high quality tubers with very little second growth. Yields could be described as moderate. Results are presented in Kentucky table 1.

While Plymouth yielded less than Kennebec and Katahdin; it did compare favorably in all tuber characteristics. Merrimack did not yield satisfactorily enough to be considered further. La 1859, continues to produce high yields of good looking tubers. Onaway and B 2858-5 were two early varieties which compared favorably to Irish Cobbler. While Pontiac produced the highest yields, the tubers were extremely low in dry matter. Redburt appeared to be the best general red variety.

Kentucky table 1. Results of yield and quality from the potato variety trial, Lexington, Kentucky, 1959.

Variety	Yield per acre			Total Solids Pct.	Notes	
	U.S.No.1 Cwt.	U.S.No.2 Cwt.	Culls Cwt.		Appearance*	Conclusions**
B 2368-4	181	19	1	18.5	M,R,sprouting smooth	Drop
B 3453-2	158	27	0	18.5	E,R,some small russ, poor	Drop
50B9-8	137	23	8	19.2	L,sm,sprouts	Drop
La 1859	183	13	11	17.9	M,R,smooth looks good	Keep
Red Beauty	93	31	2	18.1	M,R,sprouting rot, small	Drop
F 4613	131	16	4	18.7	E,large, good looking	Questionable
F 5025	106	23	2	19.2	M,sm, sprouts small	Drop
B 991-3	137	14	5	20.8	E,sm,bright sprouting	Keep
B 991-14	77	15	8	18.7	M, rough	Drop
B 2858-5	175	17	9	18.5	E,sm,sprouting looks good	Keep
F 4713	136	16	6	19.6	E,deep eyes, bright	Questionable
Plymouth	169	6	0	18.5	M,russ,good looking	Keep
Merrimack	108	20	0	18.5	L,sm,smooth looks poor	Keep
Kennebec	215	19	0	17.3	M,lg.tuber,sl. sprouting	Standard
Delus	165	15	2	18.5	L,looks good, sl.russ. lg.	Keep
Katahdin	198	24	6	15.4	L,smooth, good looking	Standard

continued

Kentucky table 1, continued.

Tawa	135	24	1	20.0	E,smooth, sm. tuber	Keep
Onaway	160	16	2	19.4	E,lg.smooth, sl. sprouting	Keep
Irish Cobbler	123	17	0	20.8	E,deep eyes,lot of sm.tubers	Standard
Red Pontiac	254	20	0	14.1	L,R,deep eyes, rough sprout	Standard
Dazoc	113	52	3	19.4	E,R,deep eyes small	Drop
Redburt	209	27	3	17.3	L,R,deep eyes lg.looks good	Keep
Manota	176	20	5	18.1	M,good looking	Keep
Red Warba	171	26	3	20.6	E,R,deep eyes sprouts	Keep
Kasota	166	47	7	19.8	M,R,sprouting deep eyes	Keep
Huinkul	108	19	4	14.1	L,sptg, rot	Drop
LSD 5%	22	4	NS	1.7		
LSD 1%	30	6		2.3		

* Appearance: E, early; M, midseason; L, late; R, red.

**Conclusion: Drop, too poor to test again; Questionable, need more information;
Keep, good, test again.

Planted, April 8; harvested, August 27 (generally all vines dead August 1);
experimental design, randomized block with 3 replications; spacing, 3-foot rows
with 10 inches between seedpieces; plot size, 1/581 acre; fertilizer, 1,000
pounds of 5-10-10 broadcast and disked in.

LOUISIANA

Julian C. Miller

The Irish potato-breeding program for 1959 continued toward its main objectives of the production of high yielding, early, red and white varieties which have scab resistance and of high nutritional qualities. Our market has requested that we select more oblong potatoes which will be suitable for french fries, shoe strings and other processed forms. Fertilizer, storage and physiological studies are receiving considerable attention. We are also continuing to cross Solanum acaule with Solanum tuberosum in order to obtain frost resistance. Progress is being made along this line.

From around 15,000 seedlings which were grown in the greenhouse at Baton Rouge in the fall of 1958, 2,809 first-year seedlings were selected and planted in South Dakota on May 12, 1959. From this number 151 selections were kept at harvesttime (September 14, 1959). These seedlings were left in South Dakota to be increased for further testing and evaluation. They are the progenies of the following twenty-five parental combinations (Louisiana table 1).

Louisiana table 1. Irish potato seedlings selected in South Dakota, 1959.^{1/}

Parentage	Number of selections	Parentage	Number of selections
12-20 selfed	1	B 605-10 x 6519	4
12-27 "	1	1859 x 6519	1
12-55 "	11	19468 x 1859	1
12-61 "	9	B 3131-8 x Katahdin	3
12-80 "	2	X 590-7 x Cayuga	4
12-91 x 1859	4	91-133 selfed	49
12-91 x 6519	4	913-2 x 6519	3
22-153 selfed	12	91-143 x 1859	4
22-153 x 6519	3	92-216 selfed	5
22-153 x Red LaSoda	1	Cobbler x 1859	1
52-42 x Red LaSoda	3	Sebago x 1859	1
6519 selfed	4	(Red LaSoda x 1859) x Katahdin	17
6-148 x 1859	3		

^{1/} Sixty-eight of the 151 seedlings are red skinned, while 83 are white.

The growing season in Louisiana was very poor, particularly following planting due to excessive rain which continued for about six weeks and caused a great deal of seed decay. However, the plantings that were made early or late came through in fair shape and made satisfactory yields, but, as a whole, the season was not satisfactory. The potato prices were better than in previous years.

All yield trials were based on plots 40 feet long with rows 4 feet apart and plants spaced 12 inches apart in the row. The plots were fertilized at the rate of 800 pounds of 5-10-5 per acre and top dressed with 200 pounds of nitrate of soda applied at the time of emergence.

Red LaSoda now ranks 6th among all varieties of seed certified in the United States. There was an increase in acreage of approximately 2,000 acres over 1957. In addition to its yielding ability, this variety is suitable both for the northern production areas as well as for the early crop in the South and is becoming a leading variety in most of the seed-producing states as well as the states growing potatoes primarily for the early, medium and late markets.

Selection Trials

The selection of seedlings is based mainly on their yielding ability, quality, and disease resistance as compared to standard varieties. These seedlings and varieties are compared under both northern and Louisiana growing conditions.

As can be seen in Louisiana table 2, only 10 of the 1957 and 8 of the 1958 seedlings were saved. It is well to note that 72-122 when grown under Louisiana conditions maintains high specific gravity and dry matter. This seedling has great promise as a breeding line. Several of the other seedlings have shown the ability to produce potatoes with total solids as high as or higher than the standard varieties. It may also be noted in Louisiana table 6 that several of the 1957 and 1958 seedlings, especially 72-60, 72-100 and 81-59 have shown a high degree of resistance to common scab.

Louisiana table 2. Data on 1957 and 1958 seedlings selected in South Dakota and Louisiana, 1959.

Seedling	Parentage	Vigor rating*	Louisiana spring grown Dry matter Pct.	Northern grown Dry matter Pct.
72-25	92-167 x 92-23	2-	18.5	18.9
72-27	92-167 x 92-23	2	18.5	18.8
72-39	12-91 x 92-23	2-	17.0	18.8
72-60	92-167 x 92-23	1	17.1	21.0
72-62	92-167 x 92-23	3	18.9	18.5
72-100	92-167 x 92-23	1	18.8	18.8
72-101	92-167 x 92-23	2-	18.5	20.0
72-122	226 x Gineke	4	21.5	—
71-148	Bona x Furore	4	18.5	21.9
Red Red LaSoda	Red LaSoda Mutant	3	—	—
82-4	92-167 x 92-23	2-	17.8	—
81-43	Yampa x 62-164	2-	17.0	—
81-59	627-164 x B 3410-27	1+	—	—
81-61	627-164 x B 3410-27	4	—	—
81-63	627-164 x B 3410-27	3-	18.5	—
81-67	627-164 x B 3410-27	3	17.1	—
81-100	B 7643 (Pungo) x Katahdin	2	19.0	—
82-104	B 7643 (Pungo) x Katahdin	4	—	—

*Plant vigor rating taken 65 days after planting: 1, very vigorous; 2, vigorous; 3, intermediate; 4, weak and 5, very weak.

Data comparing the 1956 seedlings with Red LaSoda and Sebago are presented in Louisiana table 3. As shown in this table the chipping quality of 61-125 was rated as excellent, while that of 61-81 and 61-195 was rated as very good. Both 62-91 and 62-162 produced yields comparable to those produced by Red LaSoda. Both of these seedlings show resistance to common scab, and 62-162 has shown a high degree of resistance to late blight. All of these seedlings will be further tested as to yielding ability and other qualities.

Louisiana table 3.--Data comparing Red LaSoda and Sebago with 1956 seedlings selected in Louisiana and South Dakota, 1959.

Variety or seedling	Yield in Bu/acre		Vigor ^{1/} Rating	Chip ^{2/} Rating	Louisiana grown	Northern grown
	1's and 2's	Total			dry matter Pct.	dry matter Pct.
Red LaSoda	309.0	322.8	3	3	16.6	19.9
Sebago	213.7	231.9	3	9	17.0	--
62-42	193.9	225.4	3	-	15.5	--
61-45	284.2	324.4	3	-	16.0	22.8
61-67	250.0	275.6	2	-	16.8	--
61-81	257.4	274.4	2	8	18.8	23.8
62-91	303.5	331.3	2	-	17.4	22.0
61-103	193.8	223.7	2	-	17.4	22.0
61-125	188.6	196.9	4	9	18.8	24.0
62-162	310.4	333.4	2-	4	18.8	20.9
61-193	280.7	308.5	3-	7	18.2	20.9
61-195	253.8	280.7	4	8	16.6	22.0

^{1/} Plant vigor ratings taken 65 days after planting: 1 = very vigorous; 2 = vigorous; 3 = intermediate; 4 = weak; 5 = very weak.

^{2/} Chip rating: 0 = repulsive; 1 = very poor; 2 = poor; 3 = poorly fair; 4 = fair; 5 = acceptable; 6 = fairly good; 7 = good; 8 = very good; 9 = excellent; 10 = ideal.

Presented in Louisiana tables 4 and 5 are the yields of the advanced seedlings as compared to some of the standard varieties. In table 4 the yields from plantings at four locations in the State are given. Seedling 42-45, a red seedling is quite similar to Red LaSoda in shape, skin color and smoothness. The average of the yields from the four locations shows that 91-78 was the highest yielding,

white-skinned potato in the tests. This seedling has shown resistance to both blight and scab. While 91-143 did not yield as well as the other white-skinned entries, it shows a high degree of resistance to both scab and blight and is rated as a very good chipper. It shows great promise as a breeding line.

Louisiana table 4.--Irish potato variety and advanced seedling tests at different locations in Louisiana, 1959.

Variety or Seedling	Vigor Rating ^{1/}	Yield of No. 1's per acre				
		New Roads	Donaldson- ville	Diamond	Chase	Average
		Bu.	Bu.	Bu.	Bu.	Bu.
Red LaSoda	3	285	172	223	130	202
Sebago	3	186	109	193	95	146
Katahdin	3	237	109	126	117	147
Rushmore	3	187	76	87	74	106
Kennebec		237	72	210	79	150
LaSalle	3	195	67	138	131	133
Pontiac	3	301	151	249	159	215
Cobbler		208	72	201	108	147
42-45	3	300	180	231	109	205
91-78	3	229	172	197	106	176
91-143	2	82	34	83	37	59

^{1/} Plant vigor ratings taken 65 days after planting: 1 = very vigorous; 2 = vigorous; 3 = intermediate; 4 = weak; 5 = very weak.

Louisiana table 5 gives the yields of some standard varieties and advanced seedlings over a six year period. Red LaSoda has produced the highest average yields for six years, while 42-45 has outyielded all varieties on a three year basis. Katahdin has outyielded all white-skinned varieties and seedlings but has not been as good for chipping as 91-78, 91-143 and Sebago.

Louisiana table 5.--Yields of Red LaSoda and advanced seedlings compared to yields of other standard varieties over a six-year period.

Variety or Seedling	Yield of No. 1's per acre						Average
	Year						
	1954 ^{1/}	1955 ^{1/}	1956 ^{1/}	1957 ^{1/}	1958 ^{2/}	1959 ^{2/}	
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
Red LaSoda	203	110	282	415	145	285	240
Triumph	166	81	101	184	189	-	144
Katahdin	216	122	204	297	156	237	205
Sebago	177	29	202	253	79	186	154
Rushmore	160	79	79	105	144	187	126
42-45	-	-	-	418	189	300	302
91-78	161	92	167	235	134	229	170
91-143	149	118	173	192	109	82	137

^{1/} Grown in Baton Rouge.

^{2/} Grown in New Roads.

Test on Resistance to Common Scab

A test on the resistance to common scab (*Streptomyces scabies*) of all the seedlings in the Irish potato development project was conducted at the Plaquemines Parish Experiment Station at Diamond, Louisiana. The data indicate that 72-60, 72-100 and 81-59 show a high degree of resistance. Several of the 1956 seedlings

also show a high degree of resistance. Data on resistance to scab of the standard varieties and advanced seedlings are given in Louisiana table 6. Seedling 91-143 continues to show resistance to scab.

Louisiana table 6.--Resistance of seedlings and check varieties to scab, Plaquemines Parish Experiment Station, Diamond, 1959.

Variety or seedling	Depth of lesions ^{1/}	Variety or seedling	Depth of lesions ^{1/}	Variety or seedling	Depth of lesions ^{1/}
Red LaSoda	3	61-81	2	72-101	2
Triumph	3	61-45	2	71-148	2
Rushmore	4	72-6-3	2	81-59	1
LaSalle	3	72-25	2	91-78	1
Cherokee	trace	72-60	1	91-143	1
42-45	1	72-62	2		
62-162	1	72-100	1		

^{1/} Rating from 1 to 5: 1 = very shallow lesions; 5 = very deep lesions.

In the depth of lesion column in Louisiana table 6, 1 indicates few and very shallow lesions and 2 indicates a few more lesions than appeared on those rated as 1. Ratings from 3 to 5 indicate susceptibility, and the seedlings that were given such ratings are not listed. All seedlings listed would be considered as having a high degree of scab resistance.

Resistance to Late Blight

Due to the low potency of the inoculum, the 1959 blight test was not very conclusive, therefore, all advanced seedlings having blight parentage will be re-tested this year along with the new seedlings. However, previous tests show that a number of the older seedlings, namely, 91-143, 91-78 and 62-162, have a high degree of resistance.

Equality Studies

Data on quality studies of some of the standard varieties and advanced seedlings are presented in Louisiana tables 7 and 9. Sebago, Rushmore and 91-78 had the highest rating from the standpoint of chipping quality. Seedling 91-143 was rated along with Kennebec and Cobbler. LaSalle and 91-143 were especially high in dry matter when grown under northern conditions.

Louisiana table 7.--Quality studies of several potato varieties and advanced seedlings, 1959.

Variety or Seedling	Chip rating ^{1/}	Louisiana grown Dry matter Pct.	Northern grown Dry matter Pct.	Variety or Seedling	Chip rating ^{1/}	Louisiana grown Dry Matter Pct.	Northern grown Dry Matter Pct.
Red LaSoda	3	16.6	19.9	LaSalle	7	19.7	24.0+
Sebago	9	17.0	--	Cobbler	8	19.8	21.3
Katahdin	6	19.9	--	42-45	3	17.5	19.8
Rushmore	9	18.8	--	91-78	9	18.8	22.8
Kennebec	8	19.3	--	91-143	8	17.7	24.0

^{1/} For chip rating see footnote 2/ in Louisiana table 3.

Quality studies of the 1956, 1957 and 1958 seedlings are shown in Louisiana tables 2 and 3. It is well to note that 72-122, a seedling with parentage of Dutch origin, was very high in dry matter when grown in Louisiana.

Pollen Studies

An advantage in most breeding programs is the preservation of pollen from season to season. This makes possible the hybridizing of selections or varieties which do not bloom at the same time and the use of stored pollen from a good male parent which, for one reason or another, fails to produce an abundance of highly visible pollen in the current blooming season.

Pollen has been stored, in the Irish Potato Breeding and Development Project, from one season to the next and longer in an environment of low temperature and controlled humidity. This method, however, is not always reliable since the storage setup cannot always be kept under complete control.

Extensive experiments have been carried out during the past two years in the Horticultural Research Department on the freeze-drying/gas storage of pollens. The results of the tests indicate, thus far, that pollen can be stored for an extended length of time after this treatment, even in an otherwise uncontrolled environment. Irish potato pollen has been among those tested so far; and although the optimum storage conditions by freeze-drying have not yet been attained for this pollen, (as has been for several other pollens of horticultural crops), there is little question but that such conditions will be established in the near future. It should then be possible to store Irish potato pollen almost indefinitely, and, furthermore, to ship it any distance without special precautions in packaging against loss of viability enroute.

MAINE

Hugh J. Murphy, Allen E. Schark, Michael Goven

Cooperative variety trials were conducted in Maine in 1959 at Presque Isle and Fort Fairfield, in Central Aroostook County and at Exeter in Central Maine. The parentage and main characters of the varieties and seedlings tested are given in Maine table 1. The results for yields and total solids are presented in Maine table 2 and percentages of U. S. No. 1 and Maine U. S. No. 1 (size A) are presented in Maine table 3.

In 1959 no one variety appeared to be outstanding in yield at all locations. Of the named varieties Kennebec and Katahdin ranked in the upper half of all varieties in yield at all locations. Total solids content of all varieties was low in 1959 as compared to previous years. Seedling B3563-2 appears, from one year's results to be a high dry matter variety with favorable yielding ability. Such varieties as Rushmore, Russet Sebago, and Huron yielded better in 1959 than in 1958 trials but do not appear to have any higher total solids than older standard varieties.

Results of chipping and french fry studies are presented in Maine tables 4 and 5. Very few varieties produced chips or french fries of acceptable color in 1959. French fry textures deviated considerable from the usual mealiness found in the same varieties and in most years.

Results of a variety trial conducted for the Campbell Soup Company of Riverton, New Jersey are given in Maine table 6. Many of the varieties in this trial were found to be acceptable for frozen cream of potato soup but may lack yielding ability and other characteristics that are unacceptable unless grown as special purpose varieties.

Maine table 1.--Parentage and characters of varieties and seedlings in yield trials, Maine, 1959.

Variety	Parentage	Maturity	Skin color	Disease resistance 1/
Cobbler		E	W	Virus A
Dazoc	Triumph X Neb. 49.40-3	E	R	Sc.
Huron	Sebago X Hindenburg	L	C	Sc.
Katahdin - A	40568 X 24642	L	C	Virus A, Lr, net nec.
Katahdin - B	40568 X 24642	L	C	Virus A, Lr, net nec.
Kennebec	B127 X 96-56	M	W	Lb., virus A, net nec.
Rushmore	Katahdin X Gr.Mountain	E	Russ.	None
Russet Burbank	-----	L	Russ.	Sc.
Russet Rural	-----	L	Russ.	Sc.
Russet Sebago	Selection from Sebago	L	Russ.	Sc., lb., yellow dwarf
White Rose	-----	M	W	None
B1339-12	B514-14 selfed	L	W	Lr.
B137-5	Sequoia X 47562	M	W	None
B2187-25	X1276-185 X B522-33	M	Y	Sc., Lr, vert. wilt.
B2368-4	Pontiac X B400-1	M	R	Sc.
B2894-24	Kennebec X teton	L	C	Sc., lb., virus A
B3201-38	B922-3 X B919-15	L	W	Lb., virus X, ring spot
B3293-9	B579-11 X B754-16	L	Russ.	Lr.
B3563-2	X929-3 X Katahdin	M	W-	Lr.
B3570-5	B2834-3 X (X927-3)	E	C	Lr., virus A
B605-10	Purgo X 96-56	E	W	Sc., lb.
B73-3	Mohawk X 96-56	M	W	Lb.
CS13091		M	W	
La 4112	Kennebec selfed	E	W	

1/ Late blight resistance is to the common race of the organism.

Net Necrosis is a tuber necrosis caused by current-season leaf roll infection.

Maine table 2.--Yield and total solids content of potato varieties grown at three locations in Maine, 1959.

Variety	Presque Isle		Fort Fairfield		Exeter	
	Yield	Total	Yield	Total	Yield	Total
	per acre	solids	per acre	solids	per acre	solids
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Cobbler	358	17.7	387	18.3	340	18.7
Dazoc	330	16.2	274	16.4	248	17.0
Huron 1/	362	16.8	307	17.9	332	18.3
Katahdin - A	417	15.8	395	18.1	299	17.0
Katahdin - B	398	15.4	412	17.7	341	16.8
Kennebec	372	15.6	392	17.5	317	17.7
Rushmore	394	15.8	369	17.5	310	17.0
Russet Burbank 1/	295	15.1	310	18.3	283	18.7
Russet Rural	324	16.8	335	18.5	318	18.3
Russet Sebago	333	14.7	340	17.5	334	17.5
White Rose	428	14.9	387	16.4	367	17.0
B1339-12	281	15.1	314	17.0	298	17.5
B137-5	327	14.9	324	16.2	305	16.6
B2187-25	329	16.2	340	18.3	301	17.0
B2368-4	432	16.0				
B2894-24	402	16.0	355	17.5	289	16.6
B3201-38	317	14.7	370	16.6	277	16.0
B3293-9	304	17.5			239	18.3
B3563-2	395	18.9	363	20.6	319	20.4
B3570-5	343	16.8	349	17.9	305	17.5
B605-10	365	17.0	354	18.1	301	18.3
B73-3	258	16.8	237	18.9	235	19.8
CS 13091					266	18.1
La 4112			340	16.8		
L.S.D. 5%	46	0.4	42	0.6	64	0.6
L.S.D. 1%	60	0.6	56	0.8	85	0.8

Planted	May 11	May 15	May 22
Killed	Sept. 9	Sept. 3	Sept. 14
Harvested	Sept. 16	Sept. 19	Oct. 9
Fertilizer, lbs./A	120-180-180	120-120-120	120-120-120

1/ Seedpieces of the Huron were spaced 12 inches apart; Russet Burbank 16 inches; all others 8 inches.

Maine table 3.--Percentage of yield between 1-7/8 and 4 inches in size for potato varieties grown at three locations in Maine, 1959.

Variety	Presque Isle		Fort Fairfield		Exeter	
	Class	Class	Class	Class	Class	Class
	1-7/8 to 4 inches	2-1/4 to 4 inches	1-7/8 to 4 inches	2-1/4 to 4 inches	1-7/8 to 4 inches	2-1/4 to 4 inches
Cobbler	94	65	98	79	97	71
Dazoc	95	77	88	78	96	75
Huron	96	76	97	85	91	75
Katahdin A	96	81	98	87	99	85
Katahdin B	97	78	98	85	99	84
Kennebec	96	82	97	92	99	90
Russet Rural	97	78	98	85	98	80
Russet Sebago	96	68	98	87	99	86
B1339-12	96	71	98	83	99	84
B137-5	95	76	98	89	98	84
B2187-25	96	73	95	81	98	82
B2368-4	98	90				
B2894-24	97	83	98	91	99	87
B3201-38	91	55	98	82	98	81
B3293-9	98	86			97	87
B3563-2	96	74	99	86	98	81
B3570-5	96	71	97	87	97	78
B605-10	97	77	99	85	98	76
B73-3	96	76	98	87	98	83
Cs13091					90	45
La 4112			92	89		
Rushmore	65% between 4-10 oz.		65% between 4-10 oz.		62% between 4-10 oz.	
Russet Burbank	56% between 4-10 oz.		64% between 4-10 oz.		66% between 4-10 oz.	
White Rose	62% between 4-10 oz.		45% between 4-10 oz.		56% between 4-10 oz.	

Maine table 4.--Chip color indices for potato varieties grown at three locations in Maine, 1959.1/

Variety	Presque Isle	Fort Fairfield	Exeter	Variety	Presque Isle	Fort Fairfield	Exeter
Cobbler	8.6	7.9	7.6	B2187-25	9.3	8.4	8.0
Dazoc	9.4	7.8	9.0	B2368-4	10.0		
Huron	9.8	10.0	9.4	B2894-24	7.6	6.7	7.6
Katahdin A	8.8	7.8	7.6	B3201-38	9.9	9.6	8.2
Katahdin B	8.7	7.3	7.7	B3293-9	9.2		8.9
Kennebec	9.2	8.5	7.0	B3563-2	7.9	6.9	8.0
Rushmore	9.1	7.5	7.6	B3570-5	8.7	8.5	7.9
Russet Burbank	9.7	8.4	8.2	B605-10	9.3	8.6	9.1
Russet Rural	9.5	7.9	7.8	B73-3	9.2	7.8	7.4
Russet Sebago	7.5	7.3	6.8	CS13091			8.0
White Rose	10.0	9.9	9.6	Lal112		5.9	
Bl339-12	8.7	8.0	7.8	L.S.D. 5%	0.7	0.4	0.6
Bl37-5	9.9	9.3	8.8	L.S.D. 1%	0.9	0.8	0.8

1/ 1 = very light; 10 = very dark.

Color indices based on standard National Potato Chip Color reference chart.

Maine table 5.--French fry color and texture indices for potato varieties grown at Presque Isle, 1959. 1/

Variety	Color index	Texture index	Variety	Color index	Texture index
Cobbler	8.6	1.1	Bl37-5	9.0	1.7
Dazoc	8.3	1.6	B2187-25	8.7	1.6
Huron	9.2	1.2	B2368-4	9.5	1.3
Katahdin A	8.0	1.4	B2894-24	7.3	1.3
Katahdin B	7.7	1.3	B3201-38	9.8	2.1
Kennebec	8.7	1.3	B3293-9	8.6	1.9
Rushmore	9.0	2.0	B3563-2	7.3	1.6
Russet Burbank	8.9	1.7	B3570-5	8.0	1.1
Russet Rural	8.8	1.9	B605-10	9.2	1.1
Russet Sebago	6.6	1.3	B73-3	8.8	1.5
White Rose	9.8	1.6	L.S.D. 5%	0.7	0.4
Bl339-12	8.2	1.6	L.S.D. 1%	1.0	0.6

1/ French fries with the lower index numbers are lighter in color and lower texture indices indicate mealier texture.

Maine table 6.--Yield, total solids, chip and french fry indices for potato varieties grown for Campbell Soup Company at Presque Isle, Maine, 1959.

Variety	Yield per acre	Total solids	Chip color index <u>2/</u>	French fry color index <u>2/</u>	French fry texture index <u>3/</u>
	Cwt.	Pct.			
Antigo	284	16.6	6.8	6.9	1.1
Boone	205	12.8	9.9	9.7	1.4
Cherokee	282	16.6	6.7	6.6	1.3
Chippewa	341	14.3	8.0	7.6	1.4
Cobbler	330	17.3	7.6	7.3	1.1
Delus	266	17.7	6.7	6.8	1.6
Haig	302	15.6	6.4	6.7	1.2
Katahdin	284	14.9	7.3	7.0	1.8
Kennebec	326	15.4	7.3	6.6	1.3
Manota	299	16.6	8.1	8.1	1.1
Nordak	275	16.8	6.7	6.3	1.2
Norgleam	226	17.0	6.3	5.6	1.3
Norland	322	15.1	7.3	6.7	1.1
Redbake	286	16.8	6.8	6.1	1.9
Russet Burbank <u>1/</u>	269	14.9	9.3	7.7	1.8
Russet Rural	228	15.8	8.1	7.4	2.2
Russet Sebago	225	14.1	6.5	5.8	1.9
Saco <u>1/</u>	350	15.8	8.5	7.6	1.3
Sebago	255	13.9	6.8	6.0	1.6
Tawa	265	16.0	6.6	6.1	1.4
50B9-8	217	13.0	9.7	9.2	2.2
L.S.D. 5%	34	0.4	0.7	0.7	0.4
L.S.D. 1%	45	0.6	0.9	0.9	0.6

1/ Seedpieces of Saco were spaced 12 inches apart; Russet Burbank 18 inches; all others 9 inches apart.

2/ French fry and chip color 1 = very light; 10 = very dark.

3/ French fry texture 1 = mealy; 3 = soggy.

MAINE

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Leafroll-Resistant Seedlings

Field testing for leafroll resistance was continued in 1959 following the usual procedure.

In 1959, 6872 tubers from the greenhouse at Beltsville, Maryland were planted on Arcostook Farm and tested for leafroll resistance. Fifteen crosses and 7 selfed lines were represented in this shipment.

In addition to the new seedlings and those saved from prior years for retesting, 226 selections from Chapman representing 17 crosses, 4 selfed lines and 90 named varieties were in the 1959 test.

All seedlings were read for current-season leafroll in August and those showing primary leafroll were eliminated from further consideration. Any hills not showing primary leafroll were saved for further testing. On this basis, 375 hills (5.5 percent of the 6872 seedlings growing) were saved for replanting in 1960. None of the 226 selections from Chapman were saved--all showed primary leafroll in August.

Healthy tubers of Green Mountain, Katahdin, Chippewa and Kennebec were planted systematically among the seedlings and the selections from the Chapman farm and the resulting plants were infested at the same time as the seedlings were infested with viruliferous green peach aphids. All of the plants growing from these healthy tubers showed symptoms of primary leafroll in August. This indicates that the method of inoculation was effective with these varieties.

Additional information is being presented in some of the Maine tables this year in columns headed "Healthy in 1959." In the fall of 1958, hills considered to be free from symptoms of primary leafroll were harvested and saved for further testing. In the spring of 1959, each such hill was separated into two lots--one, containing a single tuber, was planted for eventual reinfestation with viruliferous green peach aphids; the other, containing 5 tubers, was planted in another field and was not reinfested with aphids. Thus, the column "Healthy in 1959" shows the number of hills, harvested as healthy in 1958, that remained symptomless in 1959.

Results since the 1956 introductions are shown in Maine tables 7 through 13.

Maine table 7.--Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive years, 1956-1958.

Pedigree ^{1/}	Parentage	Not showing primary leafroll			Healthy in 1959 ^{2/}
		in August			
		1956	1957	1958	
		No.	No.	No.	No.
B 4095	Rural New Yorker X B 2834-3	9/360	3/9	2/3	0/2
B 4107	X927-3 X Earlane	7/334	3/7	1/3	1/1
B 4121	B 2925-23 X B 294-38	8/80	2/8	1/2	0/1
B 4122	B 2925-23 X Aquila	2/118	2/2	2/2	2/2
B 4123	B 2925-23 X B 2359-84	24/168	16/24	11/16	4/11
B 4126	B 2958-2 X B 3186-6	2/272	1/2	1/2	1/1
B 4127	B 2962-6 X B 2359-84	16/264	10/16	3/10	1/3
B 4139	B 3299-13 X B 2359-84	4/290	1/4	1/4	1/1

^{1/} 8 crosses remaining out of 22 crosses and 1 selfed line that were represented in 1956.

^{2/} Not infested with viruliferous green peach aphids in 1958.

Maine table 8.--Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive seasons, 1957-59.

Pedigree ^{1/}	Parentage	Not showing primary leafroll in August			Healthy in 1959 ^{2/}
		1957	1958	1959	
		No.	No.	No.	No.
B 4236	Houma X B 24-58	63/267	31/63	13/31	25/31
B 4239	Houma X B 3556-12	91/426	37/91	13/37	24/37
B 4261	B 24-58 X B 3556-12	11/226	11/11	6/11	6/11
B 4264	B 24-78 X B 3556-12	86/486	62/86	26/62	40/62
B 4311	B 3302-68 X B 3556-12	23/475	13/23	3/13	6/13
B 4335	Houma X B 294-38	5/165	3/5	2/3	1/3
B 1522	B 3556-12 selfed	3/61	2/3	2/2	2/2

1/ 7 crosses remaining out of 21 crosses and 1 selfed line that were represented in 1957.

2/ Reading on 5-hill lots not infested in 1958 with viruliferous green peach aphids.

Maine table 9.--Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculations with viruliferous green peach aphids in 1958-1959.

Pedigree ^{1/}	Parentage	Not showing primary leafroll in August		Surviving 2 inoculations	Healthy in 1959 ^{2/}
		1958	1959		
		No.	No.	Pct.	
B 4449	X927-3 X Katahdin	20/832	4/20	0.5	16/20
B 4451	X927-3 X B 3556-12	5/90	1/5	1.1	4/5
B 4457	B 2834-3 X B 24-58	26/188	2/26	1.1	11/26
B 4466	B 3556-12 X (X96-56)	10/225	1/10	0.4	2/10
B 4471	B 24-58 X B 3945-12	5/254	1/5	0.4	3/5
B 4490	B 3391-2 X B 3556-12	19/81	5/19	6.2	16/19
B 4491	B 3391-2 X B 3944-11	16/428	1/16	0.2	6/16
B 4493	B 3397-17 X B 3556-12	7/24	1/7	4.0	4/7
B 4586	X927-3 X B 294-38	5/202	1/5	0.5	4/5

1/ 9 crosses remaining out of 33 crosses and 3 selfed lines that were represented in 1958.

2/ Readings on 5-hill lots not infested in 1958 with viruliferous green peach aphids.

Maine table 10.--Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculations with viruliferous green peach aphids in 1959.

Pedigree	Parentage	Saved for retesting in 1960	Surviving the first year's inoculation
		No.	Pct.
B 4749	B 3393-1 x B 24-58	30/523	6.0
B 4755	Ac 25813 x B 505-44	5/817	0.1
B 4776	A 180-26 x B 2834-3	5/214	2.3
B 4790	Ac 26025 x B 2834-3	17/444	3.8
B 4791	Ac 26025 x OB 2905-1	3/194	1.5
B 4793	Ac 26025 x B 4095-1	27/254	10.6
B 4794	Ac 26025 x B 4154-2	38/251	15.1
B 4803	B 294-29 x B 2834-3	4/94	4.3
B 4836	B 3556-12 x (X1276-185)	12/75	16.0
B 4843	B 4088-4 x B 4154-2	23/180	12.8
B 4848	X927-3 x B 4154-2	12/271	4.4
B 4849	X1276-185 x B 2834-3	13/345	3.8
B 4890	Katahdin x B 24-58	15/338	4.4
B 4891	Katahdin x B 2834-3	1/179	0.6
B 4893	B 24-58 x B 2834-3	35/484	7.2
B 1571	B 2968-13 selfed	0/658	0
B 1572	B 3672-4 selfed	67/365	18.4
B 1581	B 3397-17 selfed	31/237	13.1
B 1583	B 4154-2 selfed	6/223	2.7
B 1591	B 3556-12 selfed	11/372	3.0
B 1593	B 24-58 selfed	9/62	14.5
B 1594	B 2834-3 selfed	11/192	5.7
		<u>375/6872</u>	<u>5.5</u>

Maine table 11.--Reaction of certain progenies from Iowa breeding program to leafroll infection following inoculation with viruliferous green peach aphids in 1956, 1957, 1958, and 1959.

Pedigree	Parentage	Not showing primary leafroll in August			Saved in 1959 for testing in 1960
		1956	1957	1958	
MI 1419	X927-3 x I 1077-W 28-5	11/870	8/11	1/8	0/1
I 55061	?	---	4/82	3/4	3/3

Two selections from Chapman, B 4116-3 and B 4154-4, have been infested in each of 3 years and were read as not having current-season leafroll in 1959. Both selections have a russet skin and scab resistance.

Ten leafroll-resistant seedling varieties were compared with four standard varieties for yielding ability, specific gravity, chip color and size distribution. The seedlings used in the trial were selected on the basis of leafroll resistance and commercial acceptability of vine growth and tuber appearance. Many of the seedlings have shown some resistance to leafroll over a period of several years. The trial was planted on May 16 and harvested on September 16. The results are shown in Maine table 12.

Maine table 12.--Yield, specific gravity, chip color index and size distribution of ten leafroll-resistant seedling varieties and four standard varieties. Presque Isle, 1959.

Variety	Yield ^{1/}	Solids	Chip color index ^{2/}	Yield above 2-1/4" diameter Pct.
I 1092-2	418.8	1.066	7.93	87.8
Irish Cobbler	408.6	1.069	7.53	86.6
B 3563-2	392.4	1.075	6.25	86.5
Russet Burbank	385.4	1.060	8.68	49.6
Kennebec	377.8	1.058	8.17	90.3
B 3802-15	376.5	1.069	7.50	81.1
B 3390-13	373.0	1.046	9.55	36.0
B 4127-2	360.1	No data ^{3/}	No data ^{3/}	74.2 ^{4/}
B 4121-7	337.1	1.059	7.80	93.0
Katahdin	333.2	1.057	7.55	91.1
B 3570-5	326.9	1.064	7.00	84.8
B 3827-15	297.3	1.073	6.58	77.4
B 3826-2	284.7	1.056	7.28	87.1
B 3293-9	258.9	1.068	7.05	89.8
L.S.D. 5%	40.6	0.003	N.S.	

^{1/} Yield in Cwt./A based on 6 replicated single-row plots of 20 feet each.

^{2/} Based on a 10-chip sample from each of 6 replications. Each chip was rated from 1 to 10 (light to dark) and a weighted average was calculated.

^{3/} Samples lost from late blight tuber rot.

^{4/} Based on yields from three plots.

Maine table 13.--Yields and reaction of 30 seedlings to artificial infestation with viruliferous green peach aphids, 1959.

Pedigree	Parentage	Yield in Cwt./A <u>1</u> /	Showing primary leafroll <u>1</u> / August 21
B 3826-31	X1276-185 x B 24-58	354	6.2/10
B 4095-1	Rural New Yorker x B 2834-3	316	5.2/10
B 4236-31	Houma x B 24-58	312	6.2/10
B 3802-15	B 859-10 x B 24-58	306	3.8/10
B 3802-6	B 859-10 x B 24-58	292	4.0/10
B 3563-2	X927-3 x Katahdin	289	4.8/10
B 4236-43	Houma x B 24-58	283	5.2/10
B 4145-2	Houma x B 3195-3	274	6.4/10
B 4123-10	B 2925-23 x B 2359-84	267	2.2/10
B 24-58	Imperia x Earlane	262	5.4/10
B 2971-14	B 574-14 x B 872-70	252	1.2/10
B 4264-20	B 24-78 x B 3556-12	240	5.4/10
B 4239-78	Houma x B 3556-12	237	3.6/10
B 4127-2	B 2962-6 x B 2359-84	230	5.6/10
B 4292-10	B 926-9 x B 3556-12	224	10/10
B 3826-2	X1276-185 x B 24-58	218	8.6/10
B 4122-1	B 2925-23 x Aquila	217	3.2/10
B 4343-2	B 2962-6 x ND 457-1	216	7.2/10
B 4236-3	Houma x B 24-58	216	5.6/10
B 1522-1	B 3556-12 selfed	208	7.0/10
B 4335-2	Houma x B 294-38	204	5.0/10
B 3850-2	B 2925-23 x B 2361-2	198	10/10
Chippewa	40568 x 24642	194	10/10
B 3570-5	B 2834-3 x (X927-3)	189	7.0/10
Katahdin	40568 x 24642	173	10/10
B 3293-9	B 579-41 x B 754-16	169	3.6/10
B 4264-79	B 24-78 x B 3556-12	167	3.4/10
B 4095-8	Rural New Yorker x B 2834-3	158	8.6/10
B 4127-15	B 2962-6 x B 2359-84	151	2.4/10
B 3299-13	B 936-12 x Katahdin	144	9.8/10
B 4311-3	B 3302-68 x B 3556-12	137	5.4/10
B 4126-1	B 2958-2 x B 3186-6	135	0/10
L.S.D. 5%		58	
L.S.D. 1%		76	

1/ Average of 5 replications of 10 plants each.

MAINE

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Ring Rot Resistance Studies

The results of annual screening trials for resistance to ring rot were last described and reported here in 1956. An attempt to bring this information up-to-date, inoculation results for the 1957 and 1958 introductions are reported in Maine table 14. The current season's results are not available at this time since seedlings which are saved from the inoculation plot each year must be stored for several months before tuber examinations can be made. Tuber examinations are important since certain seedlings may show only tuber symptoms the first year inoculated. Therefore, complete results of the 1959 test will appear in the 1960 report.

Seedlings found to be resistant to ring rot are reinoculated with ring rot bacteria each year following their introduction. Maine table 15 lists seedlings by year of introduction which have remained free of ring rot symptoms despite yearly exposure to the disease. Certain of these seedlings are currently being tested to detect possible masked carriers of ring rot. To date, no masked carriers have been found.

Ten ring rot-resistant seedling varieties were compared with four standard varieties for yielding ability, specific gravity, chip color and size distribution. The seedlings used in the trial were selected on the basis of degree of ring rot resistance and commercial acceptability of vine growth and tuber appearance. Many of the seedlings have shown no ring rot after severe inoculation in several successive years. The trial was planted on May 16 and harvested on September 16. The results are shown in Maine table 16.

1/ Deceased July 13, 1959.

Maine table 14.--Results of ring rot resistance studies, Maine 1959.
1957 introduction.

Pedigree	Parentage	No. seedlings tested	Field reading ^{1/}			Tuber examination ^{2/}		
			A	B	C	a	b	c
B 4079	P.I. 205623 x Merrimack	11	4	0	7	1	3	0
B 4080	P.I. 206524 x Merrimack	7	1	1	5	1	1	0
B 4105	X792-94 x B 3139-24	22	3	3	16	1	4	1
B 4132	B 3097-82 x Katahdin	29	16	1	12	11	5	1
B 4134	B 3186-6 x B 3139-24	55	16	4	35	6	10	4
B 4135	B 3139-21 x Cherokee	22	7	1	14	3	3	2
B 4136	B 3139-29 x B 355-24	9	6	0	3	6	0	0
B 4143	41956 x Earlane	3	0	0	3			
B 4149	Mary Gold x B 24-58	3	0	0	3			
B 4150	Merrimack x 1376-6	2	0	0	2			
B 4151	Merrimack x 1376-13	9	4	2	3	2	2	2
B 4156	X96-28 x B 355-24	13	3	0	10	1	1	1
B 4157	B 355-24 x B 919-5	5	4	0	1	4	0	0

continued

Maine table 14 continued.

Pedigree	Parentage	No. seedlings tested	Field reading ^{1/}			Tuber examination ^{2/}		
			A	B	C	a	b	c
B 4165	B 929-6 x B 355-24	3	2	0	1	1	1	0
B 4166	B 962-3 x B 355-24	8	3	0	5	2	1	0
B 4167	B 2837-12 x B 355-24	6	5	0	1	4	1	0
B 4168	B 3097-8 x B 2962-6	6	2	0	4	1	0	1
B 4169	B 3102-3 x B 355-24	3	3	0	0	1	1	1
B 4170	B 3139-24 x B 3201-32	8	8	0	0	5	3	0
B 4171	B 3195-3 x B 355-24	1	0	0	1			
B 4173	B 3201-22 x Ac 25976	1	1	0	0	1	0	0
B 4177	B 3508-8 x B 355-24	2	1	0	1	1	0	0
B 4179	Ac 25825 x B 355-24	4	2	0	2	0	2	0
B 4180	B 3516-11 x B 355-24	9	2	0	7	1	0	1
B 4190	B 3139-24 x Ac 25977	1	0	0	1			
B 4209	B 3516-11 x B 355-24	5	0	1	4	0	1	0

Leafroll-resistant seedlings tested for ring rot resistance

B 2971-14	B 574-14 x B 272-70	1	0	0	1			
B 3095-18	Houma x Triumf	1	0	0	1			
B 3299-13	B 936-12 x Katahdin	1	0	0	1			
B 2938-22	B 355-44 x B 522-33	1	0	0	1			
B 3397-17	B 2113-9 x B 864-2	1	0	0	1			
B 3400-1	B 24-58 x B 922-3	1	0	0	1			
B 3391-2	B 859-10 x B 24-58	1	0	0	1			
B 3566-1	X927-3 x B 2925-23	1	0	0	1			

Katahdin

controls	S 40568 x 24642	58	0	0	58			
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1958 introductions:

B 4229	Cayuga x Cherokee	1	0	0	1			
B 4233	Delus x Cherokee	8	2	1	5	0	2	1
B 4244	Merrimack x B 3139-24	10	1	0	9	0	1	0
B 4245	Merrimack x Ac 26032	20	1	3	16	1	0	3
B 4246	Mohawk x Merrimack	1	1	0	0	0	0	1
B 4249	Mohawk x Ac 26032	3	0	0	3			
B 4250	ND 457-1 x B 3139-24	17	2	0	15	0	1	1
B 4270	B 355-24 x B 4005-10	6	0	0	6			
B 4271	B 355-24 x Ac 26031	2	1	0	1	1	0	0
B 4272	B 595-76 x Cherokee	11	0	0	11			
B 4275	B 595-76 x B 3139-24	17	4	2	11	3	3	0
B 4279	B 606-37 x NC 457-1	36	1	1	34	1	1	0
B 4280	B 606-37 x B 3137-24	4	1	1	2	0	2	0
B 4281	B 606-37 x B 3309-8	11	0	2	9	0	1	1
B 4283	B 627-164 x B 3139-24	16	3	1	12	1	2	1
B 4285	B 725-6 x Merrimack	21	10	4	7	12	2	0
B 4286	B 725-6 x B 3139-24	49	30	6	13	28	6	2
B 4287	B 725-6 x B 4005-10	14	4	0	10	2	2	0
B 4289	B 902-2 x Merrimack	11	6	0	5	5	1	0

continued

Maine table 14 continued.

Pedigree	Parentage	No. seedlings tested	Field reading ^{1/}			Tuber examination ^{2/}		
			A	B	C	a	b	c
B 4290	B 902-2 x B 3139-24	26	14	5	7	12	7	0
B 4291	B 922-3 x B 3556-12	27	2	2	23	2	2	0
B 4294	B 929-32 x B 3139-24	32	4	10	18	7	3	4
B 4298	B 991-14 x B 3139-24	13	1	0	12	1	0	0
B 4299	B 991-14 x B 3556-12	26	0	0	26			
B 4303	B 3097-82 x Merrimack	13	3	0	10	1	2	0
B 4305	B 3097-82 x B 3299-13	21	5	3	13	8	0	0
B 4306	B 3139-24 x B 3556-12	2	1	0	1	1	0	0
B 4307	B 3139-24 x B 4005-10	10	2	0	8	0	2	0
B 4312	B 3309-8 x B 3139-24	21	1	1	19	0	1	1
B 4313	KB 3347-39 x Merrimack	4	0	0	4			
B 4314	B 3403-10 x B 3139-24	13	1	1	11	1	1	0
B 4315	B 3428-4 x B 3556-12	10	0	0	10			
B 4316	B 3954-5 x B 3139-24	24	1	1	22	1	1	0
B 4321	B 3707-4 x B 3139-24	25	1	5	19	1	2	3
Katahdin controls S 40568 x 24642			105		105			

^{1/} Based on 5 inoculated seed pieces for each seedling.

A = Number of seedlings having none of the hills showing ring rot symptoms.

B = " " " " one " " " " " " " "

C = " " " " two or more of the hills showing ring rot symptoms.

^{2/} All tubers from each seedling in columns A and B were stored for 6 months, snipped and examined for ring rot symptoms.

a = Number of seedlings having none of the tubers showing ring rot symptoms.

b = " " " " less than 10% of the tubers showing ring rot symptoms.

c = Number of seedlings having 10-100% of the tubers showing ring rot symptoms.

Maine table 15.--Ring rot-resistant seedling yearly introductions inoculated with ring rot bacteria each year to date.^{1/}

Pedigree	Parentage	Pedigree	Parentage
<u>1947 Introduction</u>		<u>1948 Introduction</u>	
B 721-29	Earlaine x Teton	B 909-2	055 x B 30-143
B 725-32	B 336-84 x Teton	B 911-21	055 x Teton
B 725-61	B 336-84 x Teton		
B 766-E	B 157-9 x Teton		
1949 -- None		1950 -- None	
<u>1951 Introduction</u>		<u>1952 Introduction</u>	
B 2855-5	B 721-29 x B 355-44	B 3102-3	Mohawk x B 355-44
B 2895-31	Kennebec x B 355-44	B 3141-2	B 721-29 x Teton
B 2911-23	B 446-54 x Teton	B 3141-3	B 721-29 x Teton
B 2911-29	B 446-54 x Teton	B 3142-6	B 721-29 x B 355-44
B 2911-32	B 446-54 x Teton	B 3201-38	B 922-3 x B 919-15

continued

Maine table 15 continued.

Pedigree	Parentage	Pedigree	Parentage
1953 Introduction		1954 Introduction	
B 3241-8	F 431 x B 919-15	B 3478-22	B 721-30 x Teton
B 3352-8	Saranac x Teton	B 3478-23	B 721-30 x Teton
B 3352-14	Saranac x Teton	B 3478-45	B 721-30 x Teton
B 3352-15	Saranac x Teton	B 3478-76	B 721-30 x Teton
B 3353-16	B 355-24 x B 911-31		
B 3354-21	B 721-35 x B 446-8		
1955 Introduction		1956 Introduction	
B 3596-2	B 2586-2 x Saranac	B 3832-2	B 294-38 x B 3139-24
B 3600-18	B 3021-3 x Katahdin	B 3856-7	B 3021-3 x Teton
B 3601-3	B 3021-3 x Teton	B 3857-2	Saranac x B 929-32
B 3604-1	Saranac x B 2395-14	B 3874-2	B 766-55 x Teton
		B 3876-6	B 3097-82 x B 3139-24
		B 3876-16	B 3097-82 x B 3139-24
		B 3876-17	B 3097-82 x B 3139-24

1/ These seedlings have remained free of ring rot symptoms through the 1958 inoculation trial. Results of 1959 inoculations have not been completed.

Maine table 16.--Yield, specific gravity, chip color index, and size distribution of ten ring rot-resistant seedling varieties and four standard varieties.

Variety	Yield ^{1/}	Specific gravity	Chip ^{2/} color index	Percent of yield above 2-1/4" diameter
Wy. 1122	431.4	1.059	7.55	90.0
Irish Cobbler	408.6	1.069	7.53	86.6
Russet Burbank	392.4	1.060	8.68	49.6
B 3478-45	385.0	1.063	7.88	88.1
Kennebec	377.9	1.058	8.17	90.3
B 766-E	368.8	1.067	7.63	78.4
B 3353-16	348.6	1.061	7.42	89.7
B 721-29	347.6	1.063	6.55	87.7
B 3478-22	336.5	1.056	9.82	54.5
Katahdin	333.2	1.057	7.55	91.1
B 2855-5	312.3	1.064	6.75	84.5
B 3201-38	308.8	1.051	9.32	84.4
B 3873-10	279.6	1.051	6.53	89.1
B 3601-3	245.2	1.048	7.77	87.4
L.S.D. 5%	40.6	0.003	N.S.	

1/ Yield in Cwt./A based on 6 replicated single-row plots of 20 feet each.

2/ Based on a 10 chip sample from each of 6 replications. Each chip was rated from 1 to 10 (light to dark and a weighted average was calculated.

MASSACHUSETTS

Martin E. Weeks and David Field

Twenty-four varieties of potatoes were tested in variety trials at Massachusetts Agricultural Experiment Station during the 1959 season. Tests were in cooperation with the National Potato-Breeding Program of the Agricultural Research Service, United States Department of Agriculture (Massachusetts table 1).

Massachusetts table 1. Average yield in hundred weights per acre and quality data for potatoes grown at Massachusetts Agricultural Experiment Station, 1959 season. Varieties listed in order of decreasing yield. (Average of four replicates).

Variety	Ave. yield Cwt.	Size B tubers Pct.	Ave. solids Pct.	Quality rank	Appearance of blight*
Saco	348	1.8	18.4	8	none
Katahdin	275	2.0	17.0	5	v. slight
Irish Cobbler	267	2.5	18.0	12	medium
Green Mountain	260	4.1	18.3	9	slight
Mohawk	258	0.4	18.3	10	v. slight
49 B 13-2	252	0.6	17.1	22	slight
Plymouth	243	0.3	18.0	13	slight
Merrimack	230	1.1	19.0	4	none
Pungo	221	1.8	17.6	17	medium
Sebago	218	2.0	16.5	24	slight
F 4775	216	1.0	17.8	15	severe
B 2938-22	215	4.2	19.2	3	severe
I 1092-2	206	0.5	16.7	23	medium
B 3696-13	195	5.0	19.3	1	severe
Teton	192	5.9	17.2	21	medium
La 4112	187	0.4	16.4	19	medium
Delus	181	0.2	18.7	7	severe
F 4631	175	1.5	17.8	14	medium
Cherokee	173	3.2	17.5	18	medium
B 73-3	171	6.0	18.3	11	slight
Russet Burbank	148	11.0	17.7	16	slight
F 5080	140	0.3	19.3	2	medium
B 34572	133	14.8	19.0	6	medium
B 3726-6	75	26.7	17.3	20	severe
L.S.D.	78				

* Showing on leaves 4 weeks before harvest.

Varieties were tested in plots 25 feet x 24 feet replicated four times. Four center rows were harvested for yield. Rows were spaced 35 inches apart and seedpieces averaging $1\frac{1}{2}$ ounces were spaced 10 inches apart in the row. Planting was made May 4. Plots were sprayed weekly with 4 pounds parzate per hundred gallons of water, supplemented with DDT as needed. Plots were harvested September 22 or 141 days later. Plots were planted on Merrimack sandy loam; fertilized with 1,000 pounds of 10-10-10 fertilizer per acre plus 75 pounds ammonium nitrate. Rainfall during growing season was 19.34 inches.

Farm Cooperative Tests, 1959

Variety tests were conducted on two farms—one in the Connecticut Valley and the other in the Berkshire Hills area, where potatoes are grown especially for the chipping trade.

On the Warner Farm in the Connecticut Valley, Farm "B", ten varieties were tested for yield and quality in rows 36 inches wide and with spacing 9 inches in the row. 8-10-10-2 fertilizer was used at the rate of 2,000 pounds per acre. Planting was made May 12 and harvesting October 1.

On the Albert Farm in the Berkshire Hills, Farm "A", test planting was made May 15 and harvesting September 23. 5-10-10-2 fertilizer was used at 1,700 pounds per acre in rows 34 inches apart and spacing 4 inches to 6 inches in the row. The data is presented in Massachusetts table 2.

Massachusetts table 2. Yield in hundred weights per acre and quality data for twelve potato varieties grown in single plots on farms in Hampshire and Franklin Counties by Massachusetts Agricultural Experiment Station and Extension Service*. 1959 Season.

Variety	Farm A		Farm B		
	Average	Solids	Average	Size B	Solids
	yield		yield	tubers	
	Cwt.	Pct.	Cwt.	Pct.	Pct.
Saco	413	18.6	491	6.3	17.7
Burbank	406	18.4			
Teton	367	16.9	293	10.4	
Irish Cobbler	347	18.2	215	7.8	17.0
Cherokee	331	18.2	153**	23.4	16.4
Katahdin	317	17.4	286	7.1	
Green Mountain			269	14.1	
Kennebec	317				
Mohawk	308	17.0	255	8.1	16.1
Plymouth	289	17.4	220	8.3	16.6
Delus	238	18.7	204	3.2	17.5
Merrimack	167	18.8	78**	14.8	16.9

* Tests under the direction of Dr. Martin E. Weeks and David Field with the aid of County-Agent Manager, Walter Melnick of Hampshire, County Extension Service and County Extension Agent in Agriculture, D. T. Thayer of Franklin County Extension Service. Cooperating growers were Mr. Ben Albert, Worthington (Farm A), Hampshire County, and Mr. Charles Warner, Sunderland (Farm B), Franklin County.

** affected by seedpiece rot.

MASSACHUSETTS
Robert A. Mullany

1959 Potato Yield Tests

Three potato yield tests were planted in Eastern States' territory in 1959; one in Massachusetts and two in Pennsylvania, each test being located in concentrated potato growing areas. The tests were planted in commercial growers' potato fields and, with the exception of planting, were treated culturally as their own. Sprayer rows were not involved in these tests. The experimental design was the randomized complete block, with four replicates at each location. Individual plots consisted of one 25-foot row with 10-inch spacing between plants, with the exception of Delus which was planted at an 8-inch spacing. The following information gives test locations and the fertilizer and previous cropping practices followed by each cooperator.

The farm of Fred Oswald, New Tripoli, Pennsylvania has a shaly loam soil. The previous year's crop was a clover-grass mixture in a potato-wheat-hay rotation. Ten tons per acre of manure was plowed down, with 900 pounds per acre of 8-16-8 banded in 34-inch rows. The planting date was May 18 and the harvest date October 15.

The farm of Norman Whiteside is located on heavy loam soil in the town of Oxford in Lancaster County, Pennsylvania. Clover in 1957 was followed by potatoes in 1958. Fifteen tons per acre of manure was plowed down and one ton per acre of 5-10-15 applied with the planter in 32-inch rows. The test was planted on April 23 and harvested September 29.

Clark Bros. farm in Westfield, Massachusetts has a sandy loam soil type. Previous cropping was potatoes. Seventeen-hundred pounds per acre of 8-12-12 LC was applied in 36-inch rows by the planter. The planting date was May 13 and the harvest date October 5.

Yields at all locations were better than expected, in view of a lack of rainfall in the month of September. In addition, the Oxford test did not receive its first soaking rain until mid-July. However, temperatures at the Pennsylvania locations did not run as high as normal and high humidity during warm periods reduced potential transpiration losses. The dry periods did serve to discredit those varieties or seedlings that have a tendency to go off-type.

The X-free and weak X Katahdin entries, and, the regular and weak X Chippewa samples were from Eastern States stocks. The LM selection of Katahdin was provided by Don Merriam of the Maine Agricultural Experiment Station. Huron was obtained from the Canadian Department of Agriculture. All other test lots were provided by the USDA (Maine).

Yieldwise, the 1959 tests demonstrated why the Katahdin variety is so widely grown (Eastern States table 1). Unfortunately the planting stock of Huron, which showed promise in 1958, was infected with leafroll and this served to decrease yields. It is also quite possible that this variety would do better at a wider spacing in the row. Seedlings B1339-12 and La 3769 produced US No. 1 yields comparable to Katahdin, but were significantly lower in dry matter.

Seedling 49B13-2 is like Delus in that it sets very light. A susceptibility to "jelly-end" rot and a tendency to go off-type was displayed by seedling B73-3. Seedling B2971-14 had a tendency toward "pear" shape. Though not listed in the data, red seedling B2368-4 was planted in the alleyways to check type and quality as compared to red B3453-2. The former was noted as being better yielding, with much better type and appearance than the latter. Total solids were comparable.

There was no significant differences in yield between the X-free Katahdin and the weak X Katahdin entries. The LM selection of Katahdin yielded significantly lower than the X-free at New Tripoli and Oxford, Pennsylvania, and lower than the weak X Katahdin at the latter location. The weak X Chippewa yields were significantly higher than the regular Chippewa stock at only the Oxford, Pennsylvania location.

The ratings on chip color were based on representative samples from one replication at each location being chipped as freshly harvested under commercial production conditions. This was made possible through the cooperation of the Herr and Easton Potato Chip Companies of Nottingham and Easton, Pennsylvania respectively, and the State Line Potato Chip Company of Wilbraham, Massachusetts. (Eastern States table 2)

Seedling B73-3 chipped very well, but its objectionable characteristics more than offset this. Actually, the Katahdin variety compared favorably with the other entries on a chip color basis.

Eastern States table 1.--Yield of US No. 1 tubers and percent defects^{1/}, 1959.

Entry	New Tripoli, Pa.			Oxford, Pa.			Westfield, Mass.		
	US No. 1	Defects		US No. 1	Defects		US No. 1	Defects	
	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.
Katahdin X-free	297	84	4.3	285	84	3.1	374	88	0.3
Katahdin Weak-X	276	81	5.1	306	88	1.8	374	87	0.3
Katahdin LM Selection	256	80	8.6	236	84	2.4	339	88	0
Chippewa Regular	218	70	1.5	204	73	0.4	379	87	0
Chippewa Weak-X	226	68	2.0	225	79	0.2	350	85	0.1
49B13-2	234	77	11.6	233	88	4.3	340	96	0.8
Rushmore	155	62	17.2	182	77	7.2	283	82	5.6
B73-3	100	41	33.9	150	54	30.6	242	81	4.0
Huron	169	57	11.0	-	-	-	171	59	7.2
Delus	241	85	4.7	-	-	-	335	93	0.7
B2971-14	-	-	-	117	60	14.4	217	83	1.9
B1339-12	-	-	-	311	76	1.4	-	-	-
La 3769	-	-	-	-	-	-	326	84	3.4
B3453-2 (red)	-	-	-	237	74	2.4	-	-	-
B3397-17	-	-	-	157	65	13.8	-	-	-
Manota	159	66	7.6	-	-	-	-	-	-
Keswick	171	84	3.5	-	-	-	-	-	-
L.S.D. 5%	35			47			72		

^{1/} Defects include growth cracks and off-types only.

Eastern States table 2.--Total solids and chip color rating^{1/}, 1959.

Entry	New Tripoli, Pa.		Oxford, Pa.		Westfield, Mass.	
	Total	Chip	Total	Chip	Total	Chip
	solids	color	solids	color	solids	color
	Pct.	Rating	Pct.	Rating	Pct.	Rating
Katahdin X-free	18.1	3	15.2	3	16.1	3
Katahdin Weak-X	16.6	-	15.5	-	16.3	-
Katahdin LM Selection	17.0	-	15.5	-	16.2	-
Chippewa Regular	15.8	-	14.9	2	16.0	1
Chippewa Weak-X	16.4	-	14.6	-	16.2	-
49B13-2	16.5	3	15.9	3	16.4	2
Rushmore	15.4	2	16.3	4	16.1	2
B73-3	17.9	-	17.4	4	18.7	3
Huron	19.3	2	-	-	17.0	2
Delus	19.3	2	-	-	19.2	3
B2971-14	-	-	18.4	4	20.4	2
B1339-12	-	-	14.2	2	-	-
La 3769	-	-	-	-	14.6	2
B3453-2 (red)	-	-	16.1	2	-	-
B3397-17	-	-	17.3	2	-	-
Manota	16.2	-	-	-	-	-
Keswick	17.7	-	-	-	-	-
L.S.D. 5%	0.9		0.9		0.8	

^{1/} Chip color rating code: 1 = poor, 2 = fair, 3 = good, 4 = excellent.

MICHIGAN

N. R. Thompson, D. R. Isleib,
E. J. Wheeler, W. J. Hooker, and J. N. C. Meduewesi

Seedling and variety yield trials conducted on the sandy soil of the Lake City Experiment Station were prepared in 20 ft. rows (12" spacing within the rows) and replicated 4 times. Plots were irrigated at weekly intervals. The season was unusually hot and dry with deficient rainfall. This adversely influenced tuber set and yield of certain varieties and many of the seedlings. All vines were dead by August 31 (Michigan table 1.).

Uniform trials were prepared in 9 Michigan counties and yields (Michigan table 2), specific gravity (Michigan table 3) and chip color ratings (Michigan table 4) were determined. Potato chips were made after a 6-week storage period at 55°F. A variety trial with varieties selected on the basis of suitability for frozen soup manufacture was conducted in cooperation with the Campbell Soup Company in Michigan during 1959 (Michigan table 5).

Inheritance of resistance of the immune type present in potato clone S. 41956 was studied in segregating seedling progenies. Seeds were planted in flats and transplanted to 3-inch pots. When they were 4 inches high they were mechanically inoculated with potato virus X. The inoculation was carried out three times at intervals of about two days. The plants were grown in the greenhouse in July and August.

Two weeks after the first inoculation, 3 leaflets were taken from the lower, middle and upper portions of the potato plants, folded with sterilized forceps and rubbed on two half leaves of Gomphrena globosa. After 7 days G. globosa leaves were examined for lesions. The potato plant was considered susceptible to virus X if it produced over 20 lesions in each of the two half leaves of G. globosa, and immune to virus X if it produced no lesions. Those plants that produced few lesions on G. globosa were rubbed a second time on other G. globosa plants to obtain additional information concerning the virus titre of the plants.

The majority of the seedling plants fell into 2 groups, either susceptible or immune. There were certain individuals which could not be definitely classified without further testing on G. globosa. Additional information is needed in order to complete the data so that a genetic study may be undertaken. Results of selfing Ia 1109-9 were different from those generally obtained by selfing immune plants; other seedling populations obtained by selfing Ia 1109-9 will be tested as soon as possible.

Michigan table 1.--Seedling - Variety yield trial, Lake City, 1959.

Variety	Yield per acre			Variety	Yield per acre		
	U.S. No. 1		Total solids		U.S. No. 1		Total solids
	Cwt.	Pct.	Pct.		Cwt.	Pct.	Pct.
Norland	263	99	15.6	ND 3324-2	207	86	18.0
Golden Chipper	262	92	18.0	Ms 432-IM	203	89	17.3
Plymouth	235	93	17.5	Ms 486-16C	202	97	15.4
Delus	234	99	19.4	Ms 1408-14	200	87	18.4
Ia 1111-10	226	88	19.7	Ia 1037-1	199	91	17.1
Norgleam	212	97	17.1	Nordak	197	92	17.5
Ms 478-20C	212	96	17.3	Ms 1398-64	158	83	20.7

Michigan table 2.--Yield of potato varieties and seedlings grown in 9 counties, Michigan, 1959.

Variety	Location (County) and yield of U.S. No. 1 tubers										Seed source
	Emmet	Presque Isle	Monroe	Lapeer	Allegan	Montcalm	Missaukee	Manistee	Bay		
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	
Haig	161	152	237	321	370	306	234	136	241	Nebraska	
Onaway	194	143	294	308	303	327	234	172	232	Michigan	
Early Ohio	129	94	212	---	---	212	205	134	129	Michigan	
Keswick	200	134	288	306	293	206	223	76	179	Canada	
1111-5	192	183	323	290	380	285	314	98	179	Michigan	
Fundy	153	127	317	311	327	194	187	47	194	Canada	
Katahdin	212	125	278	300	281	294	125	149	203	Michigan	
Huron	236	225	345	288	271	340	200	142	105	Canada	
123-9	267	196	215	296	276	206	223	62	98	Michigan	
1111-8	149	165	215	265	382	260	176	156	189	Michigan	
Blanca	109	152	198	188	213	206	245	100	123	Colorado	
Excel	249	156	302	306	324	356	305	231	218	Nebraska	
Russet Rural	209	212	225	---	---	212	243	129	---	Michigan	
Sebago	191	147	229	279	276	267	247	151	---	Michigan	
Merrimack	961	113	153	---	---	125	109	89	---	Michigan	
Kennebec	251	189	353	---	---	300	270	243	---	Michigan	
L.S.D. 5%	72	48	143	63	79	57	69	53	42		

1/ Poor stand contributed to low yields in Merrimack and Seedling 123-9.

Michigan table 3.--Total solids of potato varieties and seedlings grown in 9 counties, Michigan, 1959.

Variety	Location (County)									
	Emmet	Presque Isle	Monroe	Lapeer	Allegan	Montcalm	Missaukee	Manistee	Bay	
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	
Haig	19.4	20.7	18.6	16.9	15.4	17.3	16.7	17.3	17.3	
Onaway	17.3	19.0	16.5	14.8	--	16.0	15.8	16.2	17.5	
Early Ohio	19.9	19.2	18.6	--	--	16.0	16.9	16.9	16.0	
Keswick	19.4	21.2	19.7	17.1	--	17.5	18.2	19.9	18.4	
1111-5	18.6	20.9	17.1	17.3	18.2	18.2	17.7	18.8	18.6	
Fundy	19.2	20.3	19.0	16.2	17.5	17.3	17.5	18.8	18.2	
Katahdin	18.8	19.4	16.7	15.0	--	16.5	17.1	18.4	17.3	
Huron	19.2	19.7	15.4	16.9	--	18.4	18.2	17.7	18.4	
123-9	18.8	19.2	15.0	14.5	14.3	16.5	16.2	18.4	17.5	
1111-8	22.2	20.9	18.2	19.2	19.7	19.2	18.4	19.2	20.5	

Continued

Michigan table 3 continued.

Variety	Location (County)									
	Emmet	Presque Isle	Monroe	Lapeer	Allegan	Montcalm	Missaukee	Mainstee	Bay	
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	
Blanca	19.9	20.3	18.0	17.7	16.7	19.0	18.4	19.2	19.2	
Excel	20.5	20.7	18.2	17.3	18.6	16.5	18.4	18.8	21.8	
Russet Rural	19.9	19.7	16.5	--	--	19.2	18.8	19.2	--	
Sebago	16.9	19.7	15.2	16.0	18.0	19.2	16.9	18.0	--	
Merrimack	20.7	19.7	18.2	--	--	17.5	18.4	18.6	--	
Kennebec	18.0	20.5	16.2	--	--	16.5	17.7	17.5	--	

Michigan table 4.--Chip color rating 1 on potato and seedling varieties grown in 8 counties, Michigan, 1959

Variety	Location (County)						Presque	
	Ray	Emmet	Montcalm	Missaukee	Monroe	Isle	Manistee	Lapeer
Haig	5	7	6	8	6	5	6	4
Onaway	7	8	8	8	7	8	7	6
Early Ohio	4-5	7	8	8	7	6	5	--
Keswick	6-7	8	7	9	7	7	6	5
1111-5	4-5	9	8	9	9	8	7	5
Pundy	6	9	9	10	7	8	8	5
Katahdin	5	7	7	9-10	6	7	5-6	4
Huron	5-6	10	8-9	10	8	8	6-7	6
123-9	7	9	8	10+	9	7	7	6-7
1111-8	4-5	7	5-6	8-9	5-6	7	6-7	3-4
Blanca	5-6	8	7	9	8-9	7	5-6	5
Excel	5-6	8-9	8	9	9	8	7	6
Russet Rural	--	7	7	8	7-8	7	5-6	--
Sebago	--	7	7	8-9	5-6	6-7	5	4-5
Merrimack	--	7	6-7	8	7	4-5	5	--
Kennebec	--	8	7	7-8	6-7	6	7	--

1/ Chip color: 1-4, excellent; 5-6, fair; 7-8, poor; 9-10, very poor.

Michigan table 5.--Performance of potato varieties grown in Kent County^{1/}, Michigan, 1959.

Variety	Stand	Yield per acre		U.S. No. 1 above 1-7/8"	Solids
		Total	U.S. No. 1		
	Pct.	Cwt.	Cwt.	Pct.	Pct.
Red Pontiac	99	348	328	94	15.0
Chippewa	98	340	303	89	15.8
Norland	98	334	302	90	15.6
Boone	93	290	276	95	15.4
Red LaSoda	91	289	264	91	16.2
Antigo	93	259	249	96	17.1
Kennebec	94	275	241	88	16.7
Katahdin	93	266	237	89	16.7
Cherokee	99	264	234	89	17.1
Huron	86	262	217	83	18.4
Sebago	-	247	210	85	16.0
Nordak	90	234	207	88	15.2
Manota	90	220	187	85	16.5
Keswick	83	204	185	90	17.3
L.S.D. 5%			64		.003
L.S.D. 1%			84		.004

^{1/} Trials in cooperation with the Campbell Soup Company.

Michigan table 6.--Segregation for immunity to virus X in seedling populations of potatoes.

Parent	Parents													
	Ia 872-4 ^{1/}		Ia 1114-2		B595-76		Ia 902-3		Ia 1106-5		Ia 1111-5		Ia 1109-9	
	No. 2/	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Ia 872-4	89	0	93	37	84	48	100	53	101	57	82	54	12	0
							100	55			9	0	17	53
Ia 1114-2	93	37			33	91	100	78	65	45	100	80	15	73
													9	67
B 595-76	84	48	33	91									78	44
Ia 902-3	100	53	100	78					54	63				
	100	55												
Ia 1106-5	101	57	65	45			54	63					101	80
Ia 1111-5	82	40	100	80							5	60		
	9	0												
Ia 1109-9	12	0	15	73	78	44			101	80			100	0
	17	53												

^{1/} Ia 872-4 is the only susceptible parent in this group.

^{2/} No. = Number of plants tested.

MINNESOTA

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The work carried out in 1959 was a continuation of the potato breeding program described in previous reports. The combining of factors controlling adaptation, market and table qualities, red tuber color, and resistance to common scab, late blight and virus X is being emphasized in crosses for commercial varieties.

About 6800 seedlings derived from 75 crosses were grown at the Castle Danger Potato Breeding Farm. Approximately 500 selections made on the basis of general desirability will go into the initial screening trials in 1960.

A study was made to compare the Crookston (Red River Valley) and the Castle Danger (Northeastern Minnesota) locations for screening seedling families. Tubers from 1300 seedlings representing 16 progenies were grown at both locations. Observations in the field suggested that the means for foliage vigor, set, and yield of tubers were greater at Crookston than at Castle Danger while the means for tuber size were greater at Castle Danger than Crookston. The data are presently being processed. If the results from this study are favorable, seedling progenies will probably be screened at the Crookston location in the future.

Of 600 selections included in the initial screening trials, 290 were retained for further testing. Observations were made on foliage and tuber type; also clones having parents with resistance to common scab and/or late blight were tested for resistance to either or both of these diseases. The selection retained will be included in the preliminary adaptation trials in 1960.

The 1959 preliminary adaptation trials included 400 selections tested at 6 locations; 200 of these were retained for further testing. The most promising selections will be entered into more extensive adaptation trials.

Potato adaptation trials were conducted in the commercial producing area, at Grand Forks, N. D. and Hollandale, Minnesota. These plots consisted of 20 selections and varieties in 15 hill rows replicated three times. Selections showing promise over three years of testing will be entered into the large variety performance trials.

Potato variety tests were conducted at six locations in Minnesota in 1959. These trials are in cooperation with commercial growers, county agricultural agents, branch experiment stations and the Minnesota Department of Agriculture. The purpose of these plots is to familiarize the grower with new potato varieties and to assist him in evaluating the varieties for use in his area.

One hundred pounds of seed of each variety is planted in a double row with a commercial planter. Each plot is laid out in a randomized block design and replicated twice in the grower's commercial potato field. At harvest the potatoes from a row within the double row of each variety are weighed and graded for size. Samples are taken for specific gravity and chipping tests.

The following tables summarize the performance of potato varieties tested in 1959. Minnesota tables 1 and 2 present the yield, percent US No. 1 size and specific gravity of varieties grown at Grand Rapids and Osseo respectively on the light sandy soils. Minnesota table 3 gives the performance of varieties on peat soil at Hollandale, Minnesota. Minnesota table 4 presents the yield, percent US No. 1 size and specific gravity of varieties grown at three locations in the Red River Valley Area.

Minnesota table 1.--Performance of potato varieties at Grand Rapids, Minnesota, 1959.

Variety	Total Yield	No.1 Size	Total Solids	Variety	Total Yield	No.1 Size	Total Solids
	Cwt.	Pct.	Pct.		Cwt.	Pct.	Pct.
Red LaSoda	246	97	14.1	Irish Cobbler	153	81	16.9
Kennebec	202	91	15.2	Norland	145	79	15.0
Russet Burbank	196	87	16.5	Cherokee	143	84	16.5
Red Pontiac	192	87	13.3	Tawa	139	82	16.2
Boone	175	86	16.5	Plymouth	138	86	16.2
Early Gem	176	92	14.1	Redbake	135	86	15.8
Dazoc	175	86	16.5	Waseca	125	89	16.7
				Average	167	87	15.6

Cooperator: Nils Grimsbo, North Central Experiment Station, Grand Rapids, Minnesota.

Planted - May 25, Harvested September 24.

Minnesota table 2.--Performance of potato varieties at Osseo, Minnesota, 1959.

Variety	Total Yield	No.1 Size	Total Solids	Variety	Total Yield	No. 1 Size	Total Solids
	Cwt.	Pct.	Pct.		Cwt.	Pct.	Pct.
Red Pontiac	528	96	14.1	Cherokee	338	82	17.1
P-40	422	89	16.2	Dazoc	311	92	16.9
Red LaSoda	405	96	16.2	Tawa	305	94	17.3
Kennebec	396	90	17.1	Redbake	298	90	16.2
Waseca	396	96	16.7	Norland	290	90	16.2
Early Gem	376	95	15.6	Plymouth	286	97	16.7
Irish Cobbler	376	94	17.5	Boone	243	88	15.0
				Average	355	92	16.3

Cooperator: Ray Tessman; Osseo, Minnesota. Planted - May 4, Harvested Oct. 14.

Minnesota table 3.--Performance of potato varieties at Hollandale, Minnesota, 1959.

Variety	Total Yield	No.1 Size	Total Solids	Variety	Total Yield	No. 1 Size	Total Solids
	Cwt.	Pct.	Pct.		Cwt.	Pct.	Pct.
Irish Cobbler	406	93	17.5	Waseca	323	94	16.0
Red Pontiac	374	95	13.7	Tawa	309	95	16.0
Norland	366	92	15.6	Red LaSoda	269	92	14.1
Dazoc	358	88	16.0	Kennebec	261	90	15.0
Plymouth	349	96	16.2	Redbake	230	90	16.0
Cherokee	348	94	17.3	Boone	181	91	13.9
				Average	314	92	15.6

Cooperator: Brand Bros.; Southern Minnesota Vegetable Growers Association. Planted - May 16, Harvested October 6.

Minnesota table 4.--Performance of potato varieties in Red River Valley plots, 1959.

Variety	Baker			Grand Forks			Oslo			Average		
	Total	No.1	Total	Total	No.1	Total	Total	No.1	Total	Total	No.1	Total
	yield	size	solids	yield	size	solids	yield	size	solids	yield	size	solids
Red LaSoda	288	98	19.0	149	81	21.2	201	93	18.8	213	91	19.7
Red Pontiac	245	93	17.3	191	91	20.5	158	90	17.5	198	91	18.4
Irish Cobbler	220	96	20.9	167	85	23.3	200	73	21.6	196	85	22.0
Norland	214	93	17.3	144	92	19.4	225	95	17.5	194	93	18.2
Kennebec	229	90	19.7	189	92	21.2	151	91	19.9	190	91	20.1
Cherokee	215	88	21.2	108	82	22.2	173	92	22.7	165	87	22.0
Waseca	194	95	17.3	99	63	19.4	199	95	18.2	164	96	18.4
Dazoc	236	92	18.6	110	76	20.7	144	93	18.6	163	87	19.0
Tawa	209	96	19.7	121	90	22.9	152	93	20.5	162	93	20.9
Redbake	212	93	18.8	110	90	22.4	119	82	21.6	147	88	20.9
Plymouth	190	92	20.7	75	90	22.0	105	90	19.9	123	91	20.9
Boone	138	94	17.5	82	89	21.6	140	87	17.7	120	90	17.7
ND 3324-2	-	-	-	162	91	22.4	-	-	-	-	-	-
Average	216	93	19.0	131	86	21.2	164	90	19.4	-	-	-

Cooperators: Baker, Minnesota; Peter Hanson - Planted May 11, Harvested September 22.

Grand Forks, ND; Harry Earl, Red River Valley Potato Research Farm - Planted May 15,

Harvested September 9.

Oslo, Minnesota; Earl Wallinger - Planted May 29, Harvested September 23.

Common scab: The field plot for testing resistance to common scab contained 1030 clones. Table 5 gives data on the scab reaction of the selections included in the initial screening and preliminary adaptation trials. The data show the general level of scab resistance in these materials. A rating of 3 or less is considered necessary for commercially valuable resistance.

Minnesota table 5.--Reaction to common scab of selections included in the initial screening and preliminary adaptation trials.

Pustule type ¹ /	Number of clones in each scab rating group	
	Selections	Checks ² /
1	66	7
2	171	4
3	251	3
4	160	17
5	96	697
	Totals	728

1/ Pustule type estimated by thickness of lesion: 1 - very small and superficial, 5 - pitted lesion.

2/ Red Warba check at one end of each 3-hill test row.

Minnesota table 6 gives the range observed in scab ratings of 231 clones tested over a 3-5 year period. Very few clones, 3 of 108, retained the most resistant type (1 rating) for 3 years or more. The observed ratings of the majority of the clones did not vary by more than 1 class. Some, but not all, of the variation observed in scab ratings could be attributed to the location of the test row within the plot. Scab infestation, based on the responses of the scab susceptible check variety was relatively low along the edges of the plot. The effect of location within the plot on the observed variation in ratings is given in Minnesota table 2.

Minnesota table 6.--Range in scab ratings of 231 clones tested 3-5 years.

	Pustule type ¹ /	Most Susceptible rating					Total clones
		1	2	3	4	5	
Most resistant rating	1	No. 3	56	30	10	9	108
		Pct. 2.8	51.8	27.8	9.2	8.3	
	2	No. 12	46	17	15		90
		Pct. 13.3	51.1	18.9	16.7		
	3	No. 2	11	10			23
		Pct. 8.7	47.8	43.5			
	4	No. 2	6				8
		Pct. 25.0	75.0				
	5	No. 2					2
		Pct. 100					

1/ Pustule type estimated by thickness of lesion: 1 - very small and superficial, 5 - pitted lesion.

Minnesota table 7.--Variability of scab reaction of 222 clones field tested 3, 4, or 5 years.

Years of testing	Total No. of clones	No. of clones showing no deviation in scab rating	No. of clones for which "edge effect" ^{1/} explains deviations ^{2/} in scab ratings	
			No. clones varying 1 & 2 points	No. clones varying 3 & 4 points
3	123	16	40 of 88	11 of 19
4	57	6	25 of 45	5 of 6
5	42	3	22 of 25	12 of 14

^{1/} "Edge effect" refers to the less severe scab ratings associated with the edges of the plot.

^{2/} Scab rating scale of 1 - 5: 1 - very small and superficial lesion, 5 - pitted lesion. Deviations refer to the range in reading between the most severe and least severe ratings.

Field resistance to late blight: About 600 R and R₀ clones (with and without immunity genes) were screened for field resistance to late blight. The plot was planted May 27 and artificially inoculated July 6 with a mixture of 6 races of *Phytophthora infestans* (0;1;4;1,4;2,4; and 1,2,4). Disease rating notes were taken at approximately weekly intervals as soon as defoliation became detectable. For the second consecutive year, race 0 was the only one that contributed to epiphytotic, hence only R₀ clones were screened for field resistance. Approximately 6 weeks after inoculation the Waseca and Chisago check varieties were about 90% defoliated and 1 week later over 9/10 of these plants were dead. The epiphytotic was considered sufficiently severe to adequately test the R₀ material. The 1959 plot was located at the Duluth Station rather than Castle Danger as in previous years; the general response of check clones with varying degrees of resistance was consistent with that of previous years.

The distribution for field resistance to late blight of 356 R₀ clones, as estimated by percent green foliage, are presented in Minnesota table 8. The 3 most resistant clones, as indicated by 100% green foliage 50 days after inoculation are one generation selfs derived from apparent R₀ parents. No lesions were observed on these clones throughout the epiphytotic.

Minnesota table 8.--Distributions for field resistance to late blight of 356 R₀ clones (without immunity genes).

Days after inoculation	Number of clones having indicated percent of green foliage ^{1/}												Total No.
	100%	97-100%	94-97%	88-94%	75-88%	50-75%	25-50%	12-25%	6-12%	3-6%	0-3%	0	
25	24	34	48	45	53	53	44	24	16	8	6	1	356
39	10	14	20	10	28	32	47	46	29	38	49	33	356
50	3		1	10	11	13	16	7	16	18	18	191	356
Check clones													
Waseca													
25				1		2	5	5	2	1			16
39						1	1	1	2	4	7		16
50												16	16
Chisago													
25		1			1	4	3		1	2			12
39				1				1	3	1	4	2	12
50											1	11	12
Pontiac													
25			6	10	5	2							23
39					3	3	12	4	1				23
50									3	3	13	4	23

^{1/} Bennett and Horsfall system

MISSISSIPPI

W. S. Anderson

In a spring crop eleven seedlings furnished by Dr. T. P. Dykstra of U.S.D.A. were tested with the varieties Triumph and LaSoda of western-grown seed and with LaSoda of Tennessee-grown seed. The plots were located on Kaufman fine sandy loam fertilized before planting with 1800 pounds per acre of 6-8-8, side placed. Single-row plots were planted 25 feet long by $3\frac{1}{2}$ feet wide on February 25, with seedpieces spaced 12 inches. Practically a perfect stand was obtained on all lots and the growing season was considered satisfactory. Two irrigations were necessary during May. Harvesting occurred on June 4 when the early maturing lots were mostly dead. Notes were taken that date on the relative maturity of all lots. The yields were divided into U. S. No. 1 and "others", weighed immediately and the tubers placed in a storage basement. On the next day samples of each variety or seedling were checked for specific gravity with a hydrometer designed for Irish potatoes by the National Potato Chip Institute. The data is presented in Mississippi Table 1.

Mississippi table 1. Irish potato variety and seedling yield test, Mississippi State College, 1959.

Variety or seedling	Yield per acre				
	U.S.	Others	Total	Solids	Maturity
	No.1 Bu.				
6580	244	69	313	17.9	Late
Triumph*	234	95	329	15.4	Early
6078	179	66	245	17.7	Very early
LaSoda (Tenn.)	176	60	236	15.2	Early
6226	175	136	311	17.6	Early
6279 (Catoosa)	170	90	260	15.5	Medium early
1859	166	87	253	17.6	Early
6539	158	63	221	16.6	Late
6870	150	57	207	15.0	Very early
6225	139	111	250	17.7	Early
LaSoda*	132	110	242	16.5	Early
6265	131	111	242	17.7	Early
6088	101	101	202	16.6	Very early
6094	101	54	155	17.7	Late
L.S.D. 5%	44				
L.S.D. 1%	60				

* Western-grown seed.

NEBRASKA

R. B. O'Keefe, H. O. Werner and R. T. Miyoshi

I. Development of New Potato Varieties with Superior Disease Resistance, Yield and Quality.

A. Hybridization and Seedling Production.

Purposes of crosses: The main objective of the 1959 crosses was to develop varieties with increased scab resistance combined with other factors. Inbred (1 to 2 generations) parents with a high degree of scab resistance were crossed with inbred parents with specific combining ability for bright red tuber color free from skin defects (russeting, netting and over-browning). Other crosses involved inbred scab resistant parents combined with heat resistant, virus-X resistant, excellent culinary quality and/or high yielding parents. A total of 325 crosses was made utilizing 44 inbred and 21 heterozygous parents.

Seedling production: The viability of seed produced from specific crosses ranged from low to high. Approximately 2,000 progeny were transplanted in the greenhouse for tuber production for field testing and selection.

B. First Year Clonal Increase of 1957 and 1958 Seedlings in the Field.

Approximately 2200 segregates from 150 crosses were grown in the seedling plot at the Scotts Bluff Experiment Station. A total of 98 segregates were selected from the seedling plot on the basis of phenotypic superiority for combined characters.

- (1) Combined scab resistance with improvement of tuber color and skin type: Several segregates from crosses between inbred scab resistant and bright red tuber parents exhibited excellent tuber type, size, color and skin type. These will be field tested for scab resistance in 1960.
- (2) Improved uniformity of tuber size and yield ability: Segregates from inbred by heterozygous parents were selected for high tuber set and uniformity of tuber size. Several of these were derived from scab resistant parentage and will be tested for scab resistance in 1960.
- (3) Combined heat and scab resistance: Heat resistant by inbred scab resistant parents produced segregates which possessed several desirable horticultural characteristics. These will be tested for both heat (heat machine method) and scab resistance in 1960.
- (4) Long, white russet tuber selections: The Nebraska potato industry has expressed an interest in obtaining a white variety with long, russet tuber type, high dry matter content and adapted to Nebraska conditions. Several segregates from self progenies of inbred scab resistant parents were selected on the basis of these phenotypic characters. They will be increased and tested for possible release as varieties or utilized as parents for further improvement.

C. Maintenance and Screening of the Total Clonal Population.

Both parental and hybridized clonal selections are increased and screened in 5 to 25 hill plots at several locations each year. In 1959, basic clones were increased and screened at two locations as follows:

- (1) Dryland at the Box Butte Station: Seed stocks of 686 clones were increased as free as possible of virus and other diseases. The clones were also evaluated for production with dryland culture. Clones (selections) from 1955, 1956 and 1957 crosses were found to include greatly improved tuber type, color and apparent yielding ability as compared to selections from crosses of earlier years.
- (2) Irrigated Scab Test at Haig, Nebraska: Advanced clones, and selections from 1955, 1956 and 1957 crosses, (total of 485) were grown in soil heavily infested with scab (*Streptomyces scabies*). The clones were screened for scab resistance and desirable horticultural characters for production under irrigated conditions. Many clones from crosses of recent years were found to possess scab resistance combined with bright red tuber color, freedom from skin defects, good to excellent tuber type and high yielding ability. Several white and russet tuber clones were also found to possess a high degree of scab resistance combined with other desirable characters. Parentage of the scab resistant clones was discussed in detail in the 1958 report.

D. Large Scale Testing and Increase of Advanced Lines.

- (1) Increase and observation tests of advanced selections in single to multi-row plantings: The objectives of this phase of the program are (1) to observe and increase seed stocks of advanced selections as free as possible of virus and other diseases (especially ring-rot); (2) to provide seed stocks of advanced selections and varieties for utilization in outstate and other variety testing programs; (3) to provide tuber samples for culinary quality determinations and (4) to provide basic breeders seed stocks for increasing potential varieties for commercial production.
- (2) Field scale increase of superior selections: Seed stocks of the most promising advanced selections are increased to from one to several hundred bushels in plantings of from one to five acres. The plantings are isolated to meet certification standards and inspected by a Potato Certification Association qualified inspector. When superior selections warrant release as varieties, seed stocks are supplied to certified seed growers for further increase.

Results:

Seventy-two advanced selections were increased. Twenty-five of these selections were first year increases of superior clones from 1955 and 1956 crosses. These clones were selected for improved bright red tuber color, tuber type, scab resistance and apparent high yielding ability. Yields ranged from 120 to 200 bushels per acre and were equal or superior to standard check varieties.

Nebraska table 1.--Superior new selections in the major increase program.

Selection	Parents	Yield (Bu/A)	Comments
38.49-6	8.38-8 x 117.43-3	156	Dark red; Ex. type
332.51-2	B 929-32 x 223.49-3	160	White; Ex. type
27.55-2	ND 2774-3R x 25.47-7x	200	Med. red; Ex. type, size
186.55-3	72.49-1 x 131.50-2	160	Dark red; Ex. type, Sc. R.
201.55-3	222.51-5 x 131.50-2	200	Dark red; Ex. type, size
396.55-3	Redbake x ND 2906-IR	160	Med. red; Type, Sc. R.
396.55-21	Redbake x ND 2906-IR	160	Med. red, Type, Size
Checks:			
Bounty	SND 136 x 217.43-1	200	
Red Pontiac		180	

The only selection that was included in 1959 was the variety Bounty (Nebr. 156.48-2x) which was also released to 60 certified seed growers in the spring of 1959. Bounty is a high-yielding variety with medium red tubers of excellent type and uniformity of size and shape. Yields obtained from Bounty exceed those of all commercial varieties under both dryland and irrigation culture. The new variety is moderately susceptible to scab and susceptible to Fusarium internal browning when grown under adverse conditions.

E. Indexing for Disease-Free Potato Seed Stocks.

The objective is to select and increase disease-free seed stocks of all clones in the seed increase program. This project was originally developed to select ring-rot free seed sources following an outbreak of this disease at the Box Butte Station in 1953. The present project involves the use of the ultra-violet light tuber indexing method plus a sanitary management program to select and increase seed stocks free of virus, ring-rot and other diseases.

Two hundred and twenty-five "hill index" lines of sixty advanced clones and varieties plus twenty-eight 1955 and 1956 selections were included in the program in 1959. Ring-rot infection was not found in any of the lines. Low percentages of spindle tuber, leaf roll and mosaic viruses were screened from several tuber lines.

F. Production of Virus-X-Free Potato Seed Stocks.

The objectives of the project are to select, maintain and increase seed stocks free of latent potato virus-X.

Tuber lines of named varieties and advanced selections of potential commercial importance are selected for virus-X freedom by established serological techniques. Seed stocks of the tuber lines are maintained and increased in isolated plots at the Box Butte Experiment Station.

Three advanced lines and four relatively new varieties were included in the serological tests. A total of 297 tuber units, which amounted to 642 hills, were planted for testing purposes. As a result from the serological observations, 58 units or 232 hills were eliminated due to virus-X or some other plant abnormalities. Advanced selections 156.52-2 and 114.51-2 remained free of diseases. Some units of selection 222.51-9 were found to be infected. Dazoc, Excel, Haig, and Bounty also were observed and results indicate no serious infection in these varieties at this time.

Nebraska table 2.--Heat resistance of Nebraska selections.

Selection	Parents	Heat resistance class ^{1/}
1955 Selections:		
295.55-3	72.48-1 x 181.51-2	1.0
295.55-6	72.49-1 x 181.51-2	2.0
167.55-2	45.51-4 x 29.50-1	2.0
308.55-2	195.51-3 x 181.51-2	2.0
89.55-8	93.48-1 x 95.48-1	1.3
Selections from early years:		
104.52-2	295.48-1 selfed	1.0
114.49-1x	26.42-2 x Minn. 48-1	1.3
90.49-1x	204.43-1 x Minn. 43	2.0
133.53-1	155.49-1x x 144.49-14	1.0
84.51-1	(S. chac x S. tuber) x 93.47-30x	2.0
77.51-2	82.47-5x selfed	1.0
106.52-3	302.48-1 selfed	2.0
98.47-30x	59.41-P 1 x 15.40-2	2.0
Checks:		
29.47-2	101.40-3 x Ontario	4.0
L.S.D. 5%		1.2

^{1/} Average of four replications of heat machine tests (120°F., 25-30% R.H. 5 hours). Class 1 = slight leaf damage; 2 = moderate leaf damage; 3 = severe leaf and stem damage; 4 = severe leaf and severe stem damage.

G. Screening Clonal Material for Heat and Drouth Resistance.

- (1) Selections from 1955 and 1956 crosses were screened in heat machine tests (120°F., 25-30% R.H., 4 hours) for resistance to heat and heat-induced drouth. Several 1955 selections were found to have a high degree of vine resistance to heat and heat induced drouth combined with bright red tuber color (Neb. table 2). These selections may possess a wider range of adaptability to variations in seasonal conditions within and between production areas. Several selections have been supplied for testing in other areas and countries.
- (2) Chlorophyll stability and its relationship to heat resistance was studied as a possible micromethod of determining heat resistance within seedling progenies. Paired leaf samples were taken from plants of selections prior to heat machine testing. One sample was hot water treated (52°C., 30 minutes) and the other was held at room temperature. Chlorophyll was extracted in acetone from each sample. The percent light transmission was determined for each extract by means of a colorimeter. The index of chlorophyll stability (C.S.I.) was calculated for treated leaf samples on the basis of the untreated check sample. As the C.S.I. increased, heat resistance in heat machine tests increased with a correlation coefficient of 0.757** (Neb. table 3). Consequently, chlorophyll stability indexes were determined for individual selections within progenies of crosses between resistant and susceptible parents. Selections with high C.S.I. values will be heat machine tested to determine the reliability of C.S.I. as a means of selecting heat resistant clones.

Nebraska table 3.--Relationship of heat resistance to chlorophyll stability (C.S.I.). Means of three plants per replicate.

Resistance class ^{1/}	Replication (C.S.I.)			Mean ^{2/}
	1	2	3	
(295.55-3) 1	114.3	125.0	129.3	122.6*
(167.55-2) 2	107.5	88.1	123.8	104.8
(160.55-1) 3	90.3	97.5	104.2	97.3
(109.55-2) 4	96.5	95.9	89.9	94.2
Mean	102.2	101.6	111.8	

Correlation coefficient of Heat Resistance to C.S.I. = 0.757**

1/ Class 1 and 2 = Heat resistant; class 3 and 4 = susceptible; class 1 = slight leaf damage; class 4 = severe leaf and stem damage.

2/ Variety L.S.D. 5% = 20.3

H. Susceptibility of Nebraska-Grown Potato Varieties to Verticillium Wilt.

Verticillium wilt was isolated from naturally infested plants of Nebr. 156.48-2x and 315.48-3x grown at the Scotts Bluff Experiment Station. The Verticillium organism is seed and soil borne and can become a major problem in potato producing areas. Varieties differ in susceptibility to the disease and in symptom expression. Consequently, a cooperative study of the susceptibility of commercially grown varieties to the disease was undertaken by the Departments of Horticulture and Forestry, Plant Pathology and the Scotts Bluff Experiment Station.

Greenhouse tests were conducted using spore suspensions and the method described by Robinson (Wisc. Bul. 202). The studies with inoculated plants indicated that the varieties Red Beauty, Excel and Red Pontiac were least susceptible. Progress and Haig were moderately susceptible. The other varieties were highly susceptible (Neb. table 4).

Field tests were conducted utilizing replicates of fifty hills of each variety for each treatment. Treatments consisted of 1) seed inoculated with spore suspensions and 2) soil inoculation with infected wheat cultures. Data from field tests with inoculated and check plants indicated that Progress and Haig appeared to be least susceptible. Tuber infection was least with these varieties. However, Verticillium vine and tuber symptoms could not be distinguished from Fusarium symptoms.

I. Adaptability of Nebraska Selections to Production in Gulf Coast Areas.

The Gulf Coast potato producing areas are major consumers of Nebraska certified seed potatoes. In order for a variety to be of major importance to Nebraska seed producers, it must be adapted to southern growing conditions. Consequently the advanced selections from the breeding program are tested in replicated and observational trials in south Texas in cooperation with the Weslaco Experiment Station (D. M. McLean - USDA, ARS).

In 1959, fifteen named varieties and selections were included in the replicated trial (Neb. table 5). Nebraska selections 156.48-2x (Bounty) and 302.50-5 were equal or superior to the major varieties of their types grown in this area. They will be tested under field scale conditions in 1960. Several selections will be repeated in the replicated trial.

Nebraska table 4.--Susceptibility of potato varieties to Verticillium wilt in greenhouse and field tests, 1959.

Variety	Greenhouse Tests - Root Inoculation ^{1/}				Field Tests - Seed and Soil Inoculation ^{4/}					
	Isolate 156		Isolate 315		Mean		Index of Infection ^{2/}			
	Percent infect	Severity	Percent infect	Severity	Percent infect	Severity	Isolate seed	Isolate soil	Isolate seed	Mean soil
	2/ 100	3/ 2.8	2/ 80	3/ 1.7	2/ 90	3/ 2.2	101	80	102	103
Progress	100	2.8	80	1.7	90	2.2	101	80	102	103
Red Pontiac	100	1.0	100	1.4	100	1.2	101	116	107	96
Red LaSoda	80	2.0	80	2.6	80	2.3	106	104	102	99
Bounty	100	2.4	100	2.2	100	2.3	111	107	92	102
Redbake	100	3.0	100	3.4	100	3.2	128	117	104	107
Haig	80	3.2	80	3.0	80	3.1	114	83	101	94
Dazoc	100	3.2	100	2.6	100	2.9	101	107	111	102
Excel	60	1.6	20	2.0	40	1.8	101	102	102	100
Red Beauty	60	1.6	20	1.0	30	1.3	101	102	102	100
Kennebec	100	2.6	100	3.8	100	3.2	101	102	102	100
Mean	88	2.3	78	2.4	83	2.4	107.9	102.2	102.7	100.4
										103.3
										2.8
										47

1/ Inoculation of roots with spore suspension when transplanted.

2/ Infected plants as percent of total inoculated (5 plants each).

3/ Severity of wilt as rated 1 to 5; 5 = 80-100 percent of plant showing symptoms; severity of tuber infection = percent of tubers with stem end discoloration.

4/ Cutseed inoculated with spore suspension at planting time; soil inoculated with wheat-culture at planting time.

5/ No. of inoculated plants with wilt symptoms as percent of check plants with wilt symptoms.

6/ I.S.D. .05 for varieties = 17.2; for treatments = 2.5.

Nebraska table 5.--Quantitative and qualitative data for varieties included in the Weslaco, Texas test plot, 1959 (planted 1/19/59: harvest 4/20/59).

Variety or selection	Percent stand	Yield Cwt./Acre					Percent of each size or grade					Maturity <u>1</u> / 2	Specific gravity 2/
		A size		Sort out	B size	C size	Total	A size		B size	C size		
		U.S.#1						U.S.#1	Sort out				
124.48-1x Bounty (156.48-2x)	100.0 98.7	75.9 115.5	5.3 7.0	35.9 12.7	13.0 4.3	130.1 139.5	58.3 82.8	4.1 5.0	27.6 9.1	10.0 3.1	5.00 6.75	69.5 75.0	
Excel	100.0	68.8	3.4	30.7	7.8	110.7	62.1	3.1	27.7	7.0	5.50	73.5	
38.49-1	100.0	71.7	5.2	25.0	7.8	109.7	65.4	4.7	22.8	7.1	6.00	73.5	
38.49-6	100.0	59.8	7.4	19.1	5.2	91.5	65.3	8.1	20.8	5.7	5.75	78.0	
90.49-1x	95.0	71.6	9.0	2.7	9.5	92.8	77.2	9.7	2.9	10.2	6.00	64.5	
114.49-1x	100.0	57.7	6.2	21.8	10.5	96.2	60.0	6.4	22.7	10.9	5.50	88.5	
302.50-5	100.0	75.8	19.6	23.2	7.3	125.9	60.2	15.6	18.4	5.8	6.50	84.5	
28.51-4	100.0	65.8	13.0	23.3	9.5	111.6	58.9	11.6	20.9	8.5	5.75	78.0	
77.51-2	95.0	78.8	28.6	15.1	8.1	130.6	60.3	21.9	11.6	6.2	4.50	65.5	
Haig	100.0	60.6	1.2	17.9	4.3	84.0	72.2	1.4	21.3	5.1	4.25	84.0	
Redbake	100.0	104.1	3.5	14.0	4.7	126.3	82.4	2.8	11.1	3.7	6.00	74.0	
Dazoc	100.0	71.4	6.2	18.1	4.4	100.1	71.3	6.2	18.1	4.4	5.00	74.0	
Red LaSoda	100.0	118.7	9.6	10.6	2.7	141.6	83.8	6.8	7.5	1.9	5.25	71.0	
Red Pontiac	100.0	83.3	15.1	11.6	4.5	114.5	72.7	13.2	10.1	3.9	6.25	65.0	
Mean	99.2	78.6	9.4	18.8	6.9	113.7	68.9	8.0	16.3	6.2	5.60	74.6	

1/ Rate 1 to 9; 1 = vine dead, 9 = vine green and in bloom.
2/ Code by multiplying actual value by 1000 and subtracting 1000.

An additional 60 selections from 1955 and 1956 crosses were planted in observational plots. Nine of these selections will be planted in replicated trials in 1960.

J. Potato Variety Trials 1959.

Potato variety trials for 1959 were located in six areas throughout Nebraska. One plot was located in eastern and one in central Nebraska. The four additional plots were located in the western potato growing areas of the State.

County	Area	Date planted	Spacing	Date Harvested
Cass	Eastern Nebraska (dryland)	4-6-59	18"x 40"	8-13-59
Buffalo	Central Nebraska (irrigated)	4-11-59	12"x 36"	8-6-59
Sioux	Western Nebraska (irrigated)	6-12-59	12"x 36"	10-10-59
Sheridan	Western Nebraska (irrigated)	6-22-59	12"x 36"	10-13-59
Box Butte	Western Nebraska (dryland)	6-20-59	18"x 40"	9-30-59
Sheridan	Western Nebraska (dryland)	6-19-59	18"x 40"	10-1-59

Eighteen varieties and selections were included in the 1959 trials. Nine of these are selections developed by the potato breeding project of the Department of Horticulture and Forestry of this University. These are not commercially available at this time. The nine remaining varieties are grown for commercial purposes. Of the nine varieties, five of these are Nebraska releases, three released by potato breeders of other States, and one selection which is a late strain of the variety Progress.

Each selection or variety was grown in trials with four replications of twenty hills per replicate. Data such as stand, maturity, tuber color, tuber shape, scab tolerance, tuber defects, yield, grade quality, and specific gravity were obtained from each plot (Neb. tables 6 - 9).

Two of the more outstanding redskin lines are 38.49-6 and 124.48-1x. Both lines produce smooth, slightly elongated, and rather flat tubers. Tuber color was excellent and yields were better with these two lines than other red selections in the plot.

Nebraska 302.50-5 and 45.51-3 are two white tuber lines that appear very promising and warrant additional testing. The long, flat tubers of 302.50-5 are attractive, and its yielding ability and chipping quality exceeds many other white lines or varieties in the trials. 45.51-3 is a high yielding white skinned scab resistant potato. Its tubers are slightly elongated and flat. Both of these white lines shall be retested in 1960.

Dazoc continues to be the outstanding variety in eastern and central Nebraska. It is superior in several aspects (quality, appearance, and maturity) to Red Pontiac which is grown in these areas as an early crop. Bounty and Excel performed excellently in central Nebraska, and they possibly may become major varieties.

The results from Western Nebraska plots reveal Bounty and Excel as being superior in several aspects in comparison to Progress, Red Pontiac, and Red LaSoda. Bounty's ability to consistently produce higher yields along with unusually smooth and attractive tubers was most distinctive. Some of the more desirable characteristics of Excel were its tendency to yield a high percentage of U.S. #1 potatoes, tubers of desirable size, and high specific gravity.

Nebraska table 6.--Yield and quality data for varieties and selections grown in eastern Nebraska (dryland), 1959.

Variety or Selection	1/ Tuber Color	Type	Yield		A size over 1-7/8"		U.S. #1 over 1-7/8"				Percent A size			Specific gravity 2/			
			Cwt./Acre	Total	Percent of total	Defects	Percent each size			#2	#3						
							U.S.#1 A size	U.S.#1	scab			other	1		2	3/	4
Dazoc	8	8	80.8	57.1	70.7	5.1	5.9	42.2	28.4	29.2	0	4.6	6.4	75.3			
Excel	8	9	80.6	60.3	74.8	0	10.4	42.0	25.5	32.4	0	2.2	8.2	87.7			
Bounty	7	8	120.5	91.5	75.9	0	15.9	28.5	22.8	45.4	3.3	8.6	7.3	72.0			
Red Pontiac	7	8	119.0	86.7	72.8	0	17.1	22.2	25.3	49.9	2.6	11.7	5.4	61.0			
Red LaSoda	8	8	128.5	84.3	65.6	1.1	24.3	26.2	29.5	40.0	4.3	18.3	7.1	66.0			
Norland	7	9	73.3	59.1	80.6	0	2.6	42.1	35.1	22.7	0	0	2.6	66.3			
95.48-1	9	9	78.9	63.3	80.2	4.4	7.2	24.7	22.0	48.5	4.7	7.0	4.6	71.0			
124.48-1x	9	8	60.8	25.3	41.7	0	19.2	56.6	36.1	7.3	0	13.9	5.3	58.5			
38.49-6	9	9	98.6	75.3	76.3	0	8.8	26.4	32.5	39.6	1.5	4.6	4.2	75.0			
90.49-1x	8	8	93.3	74.2	79.6	1.9	7.5	20.7	29.6	44.4	5.3	3.4	6.0	76.3			
114.49-1x	7	8	66.9	44.8	66.9	0	17.9	32.0	35.3	31.0	1.6	3.8	14.1	75.3			
143.50-2	8	8	77.3	52.6	68.0	.7	13.5	47.4	27.5	23.3	1.8	7.9	6.3	76.7			
181.51-2	9	8	82.0	56.1	68.4	.4	17.2	41.1	37.7	21.2	0	11.9	5.7	84.0			
White Varieties or Selections																	
Haig	Rus	9	38.8	24.7	63.7	0	5.0	50.0	36.1	13.9	0	0	5.0	77.0			
302.50-5	Rus	9	38.1	24.9	65.4	0	8.0	53.1	32.4	14.5	0	0	8.0	77.5			
45.51-3	Rus	8	61.4	47.9	78.0	0	11.5	26.5	34.1	34.7	4.7	2.5	9.0	72.3			
156.51-2	Rus	9	46.8	29.8	63.6	0	4.5	53.6	26.8	19.5	0	0	4.5	97.0			
Mean			79.2	56.3	70.1	.8	11.6	37.4	30.4	30.4	1.8	5.9	6.5	74.6			

1/ Rated 1 to 9: 9 = dark red and/or excellent type.

2/ Coded by multiplying actual value by 1000 and subtracting 1000.

3/ Sizes: 1 = 1-7/8" - 2-1/4"; 2 = 2-1/4" - 2-5/8"; 3 = 2-5/8" - 3-1/4"; 4 = 3-1/4" - 4".

Nebraska table 7.--Yield and quality data for varieties grown in central Nebraska (irrigated), 1959.

Variety or Selection	l/ Tuber Color	Type	Yield		A size over 1-7/8" Percent of total		U.S. #1 over 1-7/8" Percent each size					Percent A size		Specific gravity 2/	
			Cwt./Acre	U.S.#1 A size	U.S.#1	Defects			1	2	3	4	#2		#3
						Total	scab	other							
Red Varieties or Selections															
Dazoc	8	7	329.1	292.2	88.8	1.0	3.5	19.9	28.1	44.6	7.4	2.5	2.0	79.0	
Excel	7	9	349.6	302.7	86.6	0	1.2	27.7	29.7	40.9	1.8	.4	.8	94.7	
Bounty	7	9	334.9	309.6	92.4	.3	1.4	9.7	26.8	58.4	5.1	1.3	.4	84.3	
Red Pontiac	7	8	354.6	329.5	92.9	0	1.8	7.6	21.5	66.1	4.8	1.5	.3	78.0	
Red LaSoda	9	8	339.9	282.6	83.1	.1	11.1	14.4	15.6	57.4	12.6	6.1	5.1	74.7	
Norland	7	9	320.5	288.3	89.9	.8	1.5	24.6	25.1	46.9	3.3	1.0	1.3	68.7	
95.48-1	9	9	265.0	240.4	90.7	0	2.0	15.2	11.9	54.7	18.2	1.9	.1	81.0	
124.48-1x	9	9	281.7	238.6	84.7	.4	1.5	20.7	26.5	50.8	2.0	1.0	.9	72.3	
38.49-6	8	9	237.2	218.1	91.9	0	0.9	14.8	26.9	52.9	5.4	0	.9	82.3	
90.49-1x	9	8	349.4	318.6	91.1	.3	2.7	11.8	11.6	53.9	22.7	2.0	1.0	78.7	
114.49-1x	7	9	282.0	244.3	86.6	4.2	2.6	21.2	30.1	43.4	5.4	5.2	1.6	85.3	
143.50-2	9	9	286.6	234.8	81.9	0	3.0	29.8	36.8	26.0	7.5	2.6	.4	81.7	
181.51-2	9	8	235.2	202.7	86.2	0	.7	34.6	42.3	23.0	0	.3	.4	86.0	
White Varieties or Selections															
Haig	Rus	7	251.2	221.2	88.0	0	1.7	20.7	28.5	44.7	6.1	0	1.7	82.7	
302.50-5	Rus	9	269.3	248.0	92.1	0	3.4	20.9	40.5	35.6	3.1	1.4	2.0	85.7	
45.51-3	Rus	8	279.9	251.9	90.0	.3	3.1	21.9	15.3	60.6	2.3	2.4	1.0	74.3	
156.51-2	W	8	271.9	211.7	77.9	0	3.5	19.9	30.2	44.4	5.5	1.7	1.8	94.7	
Mean			296.4	260.9	87.9	.4	2.7	19.7	26.3	47.3	6.7	1.8	1.3	81.4	

1/ See footnote 1, Nebraska table 6.

2/ " " " " " "

3/ " " " " " "

Nebraska table 8.--Yield and quality data for varieties and selections grown in irrigated trials in Western Nebraska, 1959 (Means of two trials).

Variety or Selection	1/ Tuber Color	Type	Yield		A size over 1-7/8"			U.S. #1 over 1-7/8"				Percent A size			Specific gravity 2/
			Cwt./Acre	U.S. #1 A size	Percent of total	Defects		1	2	3/	4	#2	#3		
						scab	other								
Red Varieties or Selections															
Dazoc	8	8	376.1	309.5	82.0	6.6	5.4	14.6	37.8	42.6	5.1	8.0	4.0	82.3	
Excel	P6	9	372.4	336.8	90.5	1.1	4.4	10.3	29.4	53.6	6.8	3.3	2.3	85.5	
Bounty	7	9	419.6	367.0	87.0	2.0	9.2	4.2	13.7	38.8	43.4	7.7	3.5	83.4	
Progress	7	9	352.2	284.0	80.3	0	14.2	21.6	39.8	37.7	.9	9.7	4.5	80.2	
Red Pontiac	8	8	384.7	324.8	83.8	0.6	13.7	7.2	19.1	60.7	13.1	10.6	3.7	74.9	
Red IaSoda	8	8	425.3	355.9	84.0	1.0	13.1	3.7	13.1	45.3	37.9	11.4	2.7	75.5	
Norland	7	9	338.2	299.6	88.0	0	17.7	11.6	32.5	50.9	5.1	5.3	2.8	74.2	
I. Progress	8	8	345.3	286.3	82.7	0	16.6	24.4	37.9	34.4	3.2	6.7	2.9	81.0	
124.48-1x	9	9	319.4	272.4	85.1	0.9	7.2	16.0	38.3	43.2	2.6	6.3	1.8	73.0	
38.49-6	9	9	327.3	287.3	87.9	9.2	8.1	8.5	25.2	46.1	20.3	2.5	5.8	80.4	
90.49-1x	9	9	372.4	323.0	86.7	1.9	7.9	11.0	19.4	47.9	21.7	5.4	2.9	84.4	
114.49-1x	7	9	283.2	250.9	88.3	1.3	4.7	15.5	25.6	39.3	19.6	3.6	1.5	90.9	
143.50-2	7	9	317.1	269.0	84.5	1.3	7.9	17.5	36.5	40.8	5.2	6.8	2.0	81.8	
181.51-2	9	9	294.1	247.6	84.6	1.4	9.3	23.3	43.6	31.1	2.1	7.2	2.0	82.0	
White Varieties or Selections															
Haig	Rus	9	299.1	307.6	87.9	3.1	7.3	8.9	21.6	49.7	20.0	2.8	4.5	83.4	
302.50-5	W	9	353.8	311.1	87.9	2.4	7.8	12.4	25.7	55.1	6.9	3.6	4.2	81.5	
45.51-3	W	8	378.8	337.9	89.1	1.5	6.5	11.9	17.6	46.8	23.8	4.1	2.4	75.0	
156.51-2	Rus	9	296.5	247.6	83.2	2.8	7.2	17.4	35.2	45.1	2.4	3.2	4.0	101.2	
Mean			347.5	301.0	85.8	2.1	9.3	13.3	28.4	45.0	13.3	6.0	3.2	81.7	

1/ See footnote 1, Nebraska table 6.

2/ " " " " " "

3/ " " " " " "

Nebraska table 9.--Yield and quality for varieties and selections grown in dryland trials in Western Nebraska, 1959 (Means of two trials).

Variety or Selection	L/ Tuber Color Type	Yield		A size over 1-7/8"			U.S. #1 over 1-7/8"				Percent A size		Specific gravity 2/	
		Total	Cwt./Acre	U.S.#1 A size	U.S.#1	Percent of total		1	2	3	4	#2		#3
						Defects	other							
Red Varieties or Selections														
Dazoc	9	8	66.3	30.8	46.4	14.0	5.0	43.0	30.7	26.3	0	15.8	3.2	77.0
Excel	P5	8	75.9	47.6	60.2	0	3.4	45.4	42.8	11.9	0	2.5	.9	92.0
Bounty	6	9	86.1	65.4	74.6	0	6.4	30.5	41.5	24.9	3.2	4.6	1.9	76.5
Progress	5	8	67.4	75.5	55.5	0	3.0	40.6	45.4	14.1	0	2.7	.2	78.2
Red Pontiac	5	7	80.7	53.6	65.6	1.7	16.2	30.0	37.7	30.7	1.7	12.5	5.3	70.1
Red LaSoda	7	8	69.1	52.7	75.5	0	5.6	19.7	39.9	35.4	5.1	4.1	1.5	76.9
Norland	5	9	71.8	50.0	69.1	0	1.8	44.2	40.8	13.0	2.1	.4	1.4	75.9
L. Progress	6	7	62.8	30.4	42.5	0	2.5	15.6	25.8	8.6	0	2.4	.2	78.7
124.48-1x	9	8	30.6	12.6	41.2	0	3.1	55.2	27.8	17.0	0	3.1	0	73.5
38.49-6	8	9	78.1	56.7	71.3	0	5.9	32.2	40.5	25.1	2.2	2.5	.3	77.7
90.49-1x	7	8	70.4	50.5	71.5	0	11.4	29.7	45.0	25.4	0	8.1	3.3	82.2
114.49-1x	6	7	51.8	25.7	44.8	0	2.2	52.3	38.7	9.0	0	2.0	.2	86.0
143.50-2	9	8	29.9	18.8	62.7	0	2.4	35.5	34.2	30.3	0	2.2	.2	81.7
181.51-2	9	8	64.6	40.3	62.5	0	2.8	34.3	44.0	10.7	11.1	1.8	1.0	84.9
White Selections or Varieties														
Haig	Rus	8	75.6	61.4	81.1	0	4.0	22.8	44.1	30.1	3.2	3.4	.6	82.5
302.50-5	W	8	84.2	45.1	53.1	0	18.9	35.6	35.2	29.2	0	18.0	.9	84.5
45.51-3	W	8	62.7	42.8	66.4	0	3.5	29.2	35.4	32.6	3.0	3.2	.3	72.5
156.51-2	Rus	7	56.4	21.1	36.4	0	.1	65.4	29.3	5.4	0	0	.2	101.3
Mean			65.8	43.4	60.0	.9	5.5	36.7	37.7	21.1	1.8	5.0	1.2	80.7

1/ See footnote 1, Nebraska table 6.

2/ " " " "

3/ " " " "

II. Breeding Potato Parental Lines for Resistance to Scab, Heat and Drouth: Contributing to: NC-35 Potato Improvement Through Parental Line Breeding.

A. Scab Resistant Parental Lines.

The objectives of the work in progress are (1) to develop parents with high degree of specific combining ability (dominance effect) for scab resistance, (2) to develop parents with general combining ability (additive gene effect) for scab resistance and (3) to determine the most efficient breeding procedure for obtaining parental lines with combining ability for scab resistance based on the type or types of gene action involved.

- (1) In 1959, parent-offspring regressions for scab resistance were obtained from progenies of selected male parents mated to random female parents. Progeny distributions and regression data are presented in Nebraska table 10. A heritability value (in broad sense) of 0.62 was obtained from the data, with 59 percent (r^2) of the variability among progeny being attributable to the regression. These results would indicate that minor gene (additive) effects are of as great or greater importance in the inheritance of scab resistances as the dominant gene and gene dosage effects demonstrated by Dr. F. A. Krantz.

Deviations from regression were greater as the resistance of the male parent increased, which can be assumed to be partially due to an expression of dominance and gene dosage effects. Replicated field tests to account for environmental and genotype-environment components of variance are needed to verify this assumption.

Nebraska table 10.--Parent-offspring regression for the inheritance of scab resistance; progenies derived from crosses between random females and selected male parents.

Male parent	Resist. class	Progeny distribution in scab classes										Total	Progeny Mean
		0	1	2	3	4	5	6	7	8			
143.49-1	1	2	3	5	2	2					14	1.9	
156.52-2	1	1	4	7	13	17	10	2	2		56	3.6	
45.51-3	1		3	0	2	1					6	2.3	
154.49-3	2		1	1	2	4	1				9	3.7	
77.51-2	2	1	0	2	3	4					10	2.9	
114.51-2	2		12	9	9	11	5	1	2	1	50	3.1	
164.51-2	2	1	6	13	7	9	0	1	1		38	2.7	
378.48-2x	2		6	0	1	1	1				9	2.0	
104.52-2	2		1	0	1	1	0	1			4	3.5	
25.47-7x	2			2	0	3	1				6	3.5	
Haig	2		2	3	2	0	0	1			8	2.5	
114.49-1x	3		1	0	6	7	2	2			18	3.8	
29.47-2	3		2	3	0	4	3	1			13	3.5	
84.51-1	4		2	3	0	3	4				12	3.3	
240.54-1	4		1	0	2	6	1				10	3.6	
93.48-1	5			1	4	7	1	1	1		15	4.0	
Bounty	6		2	3	4	9	3	2			23	3.6	
90.49-1x	6		3	2	2	8	12	0	3	1	31	4.3	
215.50-2	6					4	6				10	4.6	
131.50-2	6	1	0	4	10	12	6				33	3.5	
140.47-1	8		1	1	5	5	5	3	1	3	24	5.3	
Total		6	50	59	75	118	61	15	10	5	399	3.4	

Estimated $y = .309X + 2.38$; $r = .768^{**}$; $H = .62$ (broad sense).

If dominance and additive gene effects are of equal importance in the inheritance as indicated by the data, the most efficient breeding procedure for developing scab resistance parental lines would be a combined inbreeding and reciprocal recurrent selection program. To test this hypothesis, highly scab resistant progenies selected from S_1 , S_2 and S_3 generations of scab resistant parents in 1959 will be utilized in continued inbreeding and reciprocal recurrent selection programs and tested for both general and specific combining ability.

- (2) Correlation of scab resistance of progenies in clonal C_1 and C_2 generations: The objectives of this phase of the program are (1) to determine the effectiveness of selecting for scab resistance in C_1 generation of progenies, (2) to determine the most efficient level of selection, and (3) to obtain an estimate of the environmental variance or effect encountered in statistical studies of the inheritance of scab resistance.

Three hundred and nineteen (319) progeny of 1957 crosses (report in 1958) selected in the C_1 generation were replanted in a scab test plot in 1959. The resistance of individual selections in the C_2 generation was directly correlated to the resistance in the C_1 generation ($r = 0.359^{**}$). The coefficients of variability in the C_1 and C_2 generations were 93 and 49 percent respectively, indicating the increased reliability of the selection in the C_2 . Variance due to environments (years) accounted for 8.7% of the total phenotypic variance. Differences between clonal generations as well as between clones were highly significant.

Replicated field trials will be planted in 1960 to obtain additional estimates of environmental as well as genotype-environment interaction variances.

- (3) Combining scab resistance with bright red tuber color: Inbred S_1 and S_2 highly scab resistant parents were crossed with inbred parents with relatively high specific combining ability for red tuber color. Selections were made from the C_1 generation of crosses in 1959 for bright red tuber color free from skin defects (netting, over-browning, etc.). The selections will be field tested for scab resistance and then screened for parental combining ability for the two characters.

Additional crosses were made between inbred S_2 and S_3 parents for the two characters in 1959 and the progenies will be screened in 1960.

B. Genetic Studies and Development of Heat and Drouth Resistant Parental Lines.

- (1) Genetic studies of the inheritance of heat resistance: Genetic inferences obtained from selfs and crosses of heat resistant by susceptible parents and reported in 1957 and 1958 were studied further in 1959. Parent-offspring regressions were determined for the self and cross progenies (based on the male parent) as indicated in Table 11. The correlation coefficients for relationship of progeny to parental resistance for the self and cross progenies were .535 and -.537 respectively, both of which were significant at the 8+% level. The heritability values were 0.24 and 0.34 respectively. The low heritability values indicate that dominant and/or relatively few genes are involved in the inheritance. Ratios of susceptible to resistant progeny indicated that susceptibility was dominant.

Nebraska table 11.--Parent-offspring regression of self and cross progenies as related to the resistance of the male parent.

Self progeny		Cross progeny	
Parent resist.	Mean progeny resist.	Parent resist.	Mean progeny resist.
1	3.12	1	3.00
1	1.70	1	2.70
1	2.16	1	2.79
1	2.57	2	2.08
1	1.67	2	2.67
2	3.44	4	1.90
2	2.97	4	1.63
4	3.14	4	1.93
4	3.00	4	2.57
4	2.87	4	2.86
		4	2.33
		4	2.53
Est. Y = 0.24X + 2.16		Est. Y = 2.92 - 0.17X	
r = .535		r = -.537	
H = .24		H = .34	

The inverse relationship of progeny to parental resistance in the resistant by susceptible crosses can possibly be explained by maternal cytoplasmic effects in the inheritance, since resistant females were utilized in all crosses. The cytoplasmic effect would be considered to be constant within self progenies so that genetic resistance between progeny would increase as parental resistance increased.

Parental clones utilized in this study have been carried into the S₁, S₂ and S₃ generations for comparable studies at the various levels of inbreeding utilizing previously reported heat machine testing techniques. Parental heat resistant lines will be developed from this material.

- (2) Correlation of field resistance to heat resistance as determined by heat machine tests: Progenies which were heat machine tested as reported in 1958 were field tested in Lincoln, Nebraska, in 1959 to obtain information regarding (1) the reliability of heat machine tests for screening seedling progenies for heat resistance and (2) determine the relationship of tuber resistance to heat necrosis to vine resistance. Though several short periods of high temperature occurred during the season, only slight to moderate vine damage was observed with very little variation between clones. Cross sections of tubers of the various clones will be observed for heat necrosis when the tubers are cut for planting in 1960.

III. Development of Potato Chipping Varieties Suitable for Production in Nebraska.

Three hundred and eighty-five clones within the breeding program were screened for chipping quality by established deep-fat frying techniques (375°F., 2 minutes). Determinations were made utilizing 2 replicates of 110 gms. of fresh tuber slices for each seedling.

Chips produced from tubers of the various clones were classified as to desirability and uniformity of color as determined visually and by standard colorimetric procedures. Chip yield per 100 pounds of fresh potatoes, dry matter content, and fat absorption were also determined (Nebraska table 12). Rd values of 25 to 35 were representative of commercial potato chips obtained from tubers that had not been subjected to cold storage.

Sixty-eight clones were found to have excellent chipping quality and recovery of chipping quality following 6 months of cold storage treatment (38°F.), followed by reconstitution at 70°F. for 3 weeks. These clones will be increased and field tested for potential use as commercial varieties. A detailed analysis of pedigrees of the various clones is being made for purposes of determining possible parental sources for breeding for improved chipping quality.

The Haig variety has been found to produce acceptable to excellent potato chips when grown with proper culture and when unchilled or reconstituted for 2 to 3 weeks at 70°F. following short periods of chilling. Nebraska 302.50-5 has been found to be superior to Haig and is being increased for potential use as a chipping variety.

Nebraska table 12.--Chipping quality of superior selections following 6 months of storage at 38°F. followed by reconstitution at 70°F. for 3 weeks.

Selection	Percent dry matter	Chip color Rd1/ Rd2	Chip yield (lbs./100 lbs.)	Percent fat 2/	Parents	
					Female	Male
194.56-1	20.9	45.5	32.7	36.1	25.47-7x	Selfed
195.56-1	19.9	44.9	31.8	37.5	91.48-1	Selfed
172.56-1	20.2	44.8	33.6	40.1	181.51-2	156.52-2
68.55-1	25.6	44.4	34.5	25.8	93.48-1	229.47-1
112.56-1	26.5	41.6	38.2	30.6	Excel	181.51-2
204.56-1	19.1	40.7	30.9	38.2	114.51-2	Selfed
83.56-1	26.5	40.2	36.4	27.0	29.47-2	114.51-1
398.55-7	22.8	39.8	34.5	33.9	95.48-1	ND2906-1R
396.55-28	22.2	39.3	35.5	37.3	Redbake	ND2906-1R
115.55-1	23.3	38.9	33.6	30.8	143.50-2	320.48-1x
182.56-1	22.0	38.7	33.6	34.5	140.47-1	USDA 1859
88.55-2	25.0	38.73	35.5	29.4	93.48-1	ND2774-15R
295.55-3	21.2	38.6	34.5	38.6	72.49-1	181.51-2
135.56-3	19.3	38.6	30.9	37.4	93.48-1	395.51-1
96.56-2	20.1	37.7	33.6	40.3	222.51-9	114.51-2
78.56-5	22.7	37.5	34.5	34.2	93.48-1	83.51-5
396.55-23	19.8	37.3	31.8	37.8	Redbake	ND2906-1R
10.56-2	20.1	37.2	33.6	40.3	83.49-1	29.47-2
4.55-1	22.0	36.9	31.8	31.0	45.51-4	Redbake
196.55-2	21.2	36.9	32.7	35.3	45.51-3	131.50-2
148.56-1	21.8	36.8	34.5	36.8	---	---
396.55-3	20.8	36.8	33.6	38.2	Redbake	ND2906-1R
183.56-6	22.8	36.8	35.5	35.7	93.48-1	USDA 1859
95.55-2	22.9	36.7	35.5	35.3	229.47-1	Haig
192.56-1	18.7	36.5	31.8	41.2	104.52-2	B3131-N2
100.56-1	20.4	36.4	33.6	39.5	111.52-1	114.51-2
396.55-20	20.5	36.3	31.8	36.3	Redbake	ND2906-1R
85.55-2	24.2	36.1	34.5	30.0	45.51-4	93.48-1
15.56-1	19.8	35.9	33.6	41.2	215.50-2	29.47-2
83.55-8	26.2	35.8	36.4	28.0	215.50-2	93.48-1
318.55-2	21.6	35.6	35.5	39.1	---	---
182.56-1	20.9	35.2	33.6	37.8	140.47-1	USDA 1859
103.56-1	22.5	35.1	33.6	33.0	USDA 1859	114.51-2
Checks:						
Dazoc	16.4	35.1	30.9	46.8	Tri 22	49.40-3
Cayuga	20.7	21.6	32.7	36.9	---	---
302.50-5	20.3	20.4	31.8	36.3	Kosota	B528-170
Red Burt	21.1	17.6	30.9	31.7	---	---
Norland	17.9	15.7	29.1	38.5	---	---
Haig	21.9	14.0	33.6	35.0	Cayuga	Minn 43
L.S.D. 5%		3.0				

1/ Rd values calculated on basis of 100% white standard.

2/ Fat absorption determined by extracting fat from 10 gm. of chips in 75 ml. of toluene.

NEW HAMPSHIRE

Allen E. Schark, H. J. Murphy, M. J. Goven and P. T. Blood

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A potato variety trial was conducted in New Hampshire by the Crops Research Division, U. S. Dept. of Agriculture in cooperation with the Agronomy Departments of the Maine and New Hampshire Agricultural Experiment Stations.

The climate and soil of eastern New Hampshire is very similar to the potato growing area of southwestern Maine. In the past, potato cultural recommendations for that region of Maine have been used by the potato growers of New Hampshire. For this reason, the material presented in this report has also been included in the Maine Potato Variety Trial Report for 1959.

A replicated yield trial of 8 potato varieties, plus 8 additional varieties each in a single 25-foot observation row, were grown at Northwood, New Hampshire. The yield trial consisted of 25-foot plots replicated four times. Spraying and cultivation practices were the same as those used by potato growers in the area. Climatic conditions in New Hampshire this year were good for potato production. Temperatures were moderate and rainfall was plentiful. Weighing and grading of the plots as well as quality tests, were made at the New Hampshire station. An additional sample for potato chip processing and specific gravity determination was sent to Aroostook State Farm, Presque Isle, Maine.

Yield, percentages of solids, and potato chip color data are shown in New Hampshire table 1. Huron and Green Mountain were the highest yielding varieties. There is no significant difference in their yields. Huron compares favorably with the other varieties in all respects except potato chip color. It produced the second darkest colored chip. Only Green Mountain chips were darker in color. However, since any color above 7.0 or 7.5 is considered unacceptable, Dazoc is the only variety that produced commercially usable chips. Green Mountain had the highest percentage of solids. Two varieties, Huron and B73-3, were second in solids content.

New Hampshire table 2 lists the yield, percentage of solids and chip color of the 8 observation varieties. The data listed in the table is not conclusive since it is based on a single 25-foot row. It is useful primarily as an aid in formulating future planting plans. One of the entries, F4713 (Avon) is the recently-named and released Canadian variety Avon. Particular mention should be made of the three varieties, F4713 (Avon), La4112, and Antigo. In 1959, most of the standard chipping varieties produced very dark-colored chips, yet under the same conditions, these three varieties produced exceptionally light-colored chips. In addition, one of the three, F4713 (Avon) had the second highest solids content.

Three of the varieties in this table, Ia1111-5, F4713 (Avon), and La4112, will be included in a replicated yield trial in 1960.

New Hampshire table 1.--Variety yield test, Northwood, New Hampshire, 1959.

Variety	U.S. No. 1 tubers ^{1/} Per acre			2½" - 4" tubers Ave. wt.		Chip color ^{2/} after harvest
	Bu.	Cwt.	Pct.	Oz.	Pct.	
Huron	588	353	93	6.2	20.8	9.5
Gr. Mountain	524	314	84	7.7	21.1	10.0
B2894-24	480	288	93	7.3	18.5	8.1
Katahdin	479	287	92	7.2	18.1	8.6
B73-3	444	266	94	7.1	20.8	8.1
B1339-12	435	261	95	6.1	18.9	8.1
Dazoc	422	253	91	5.8	18.1	7.1
B137-5	416	250	91	7.9	18.5	9.1
L.S.D. 5%	69	41			1.1	

^{1/} Tubers 1-7/8" - 4" in diameter.

^{2/} Color indices based on standard color chart of the National Potato Chip Institute. The figure 1 represents a very light color and the figure 10 a very dark color. A color rating above 7.5 is too dark for commercial use.

New Hampshire table 2.--Yield, solids content, and potato chip color of eight potato varieties grown in a non-replicated observation plot at Northwood, New Hampshire, 1959.^{1/}

Variety	U.S. No. 1 tubers ^{2/} Per acre			Solids		Chip color ^{3/} after harvest
	Bu.	Cwt.	Pct.	Pct.		
Ia1111-5	526	315	92	21.7		9.2
50B9-8	498	299	95	18.9		8.9
La3769	452	271	90	16.6		10.0
F4713(Avon)	426	256	95	20.2		6.1
La4112	420	252	88	18.9		5.0
B3299-13	362	217	88	19.4		10.0
CS13091	243	146	68	19.8		8.1
Antigo	198	119	70	18.9		5.0

^{1/} Based on one row 25 feet long.

^{2/}, ^{3/} See footnotes New Hampshire table 1.

NEW HAMPSHIRE
Paul T. Blood

Supplementary Variety Yield Test

Nineteen varieties and seedlings were planted at Northwood, May 6, in single rows 100 feet long. Approximately 1,600 pounds of an 8-12-12 fertilizer low in chlorine content was applied per acre.

Samples for chipping were stored at 40° F. and warmed up for 16 days before frying in cottonseed oil at 375° F. The results are presented in table 3.

New Hampshire table 3.--Yield, total solids, and chipping quality of 19 potato varieties grown in New Hampshire, 1959.

Variety	Yield		Chip color rating ^{1/}	Variety	Yield		Chip color rating ^{1/}
	per acre	Total solids			per acre	Total solids	
	Bu.	Pct.			Bu.	Pct.	
Saco	775	20.3	F	46121	494	19.2	E
Kennebec (X free)	603	20.3	E	Merrimack (USDA)	481	21.8	-
Kennebec	596	20.1	E	Rushmore	451	19.2	G
Plymouth ^{2/}	594	19.4	P	Cherokee	433	19.3	G
Green Mountain	580	21.4	P	Rukat	431	19.2	P
Russet Rural	579	20.3	G	F451	427	18.6	E
Early Gem ^{2/}	567	19.4	F	I. Cobbler	397	18.7	P
B932-92 ^{2/}	544	21.9	E	Norland	375	18.2	P
Delus	516	22.0	G	Merrimack (N.H.)	367	21.8	-
43-50	513	18.2	F				

^{1/} Chip ratings: E, excellent; G, good; F, fair; P, poor.

^{2/} First year these varieties yield well.

NEW JERSEY
John C. Campbell

Three variety tests were conducted in New Jersey under the direction of the Plant Pathology Department of the New Jersey Agricultural Experiment Station. These tests were conducted to evaluate several recently released potato varieties for yield, market quality, and processing quality under New Jersey conditions.

Several USDA seedling varieties were also planted to determine their adaptability to New Jersey conditions with the hope of finding seedlings that will produce acceptable yields of high quality potatoes.

Chip and French fry color and texture were determined for all varieties in the Food Science Department at Rutgers and frozen French fry quality of varieties grown at Seabrook Farms was determined in their Quality Control Laboratory.

Simonson Experiment. Twenty-three named varieties and 8 USDA seedlings were grown on the Simonson Farm at Cranbury. Potatoes were planted by machine on April 7 in 2-row plots, 49 feet long. Seed was spaced 10" x 36" and fertilized with 2300 pounds of 5-10-10 per acre. Temperatures averaged above normal and rainfall was supplemented with 4 inches of irrigation water applied through rotating sprinklers as needed. Twenty varieties were replicated 4 times. Other varieties were replicated 1, 2 or 3 times as noted in New Jersey tables 1 and 2.

New Jersey table 1.--Potato variety test, Simonson Bros., Cranbury, N. J., 1959.

Variety	Yield per acre				Remarks
	Total	U.S. No.1	U.S. No.1	Total solids	
	Bu.	Bu.	Pct.	Pct.	
Chippewa	627	593	94	14.4	No pick-outs
B355-35	615	557	90	15.3	2% knobby
Kennebec	649	556	85	16.6	7% B size, 6% knobby, many badly skinned
Houma	661	529	80	16.5	16% B size
Teton	567	518	91	15.5	6% B size, 1% knobby
Pungo	573	516	90	17.1	5% B size, 3.5% growth cracks and knobby
Huron (N.Y.)	666	509	76	17.0	4% knobby, 14% B size
Plymouth	557	487	87	16.1	7% knobby
Antigo	504	464	92	15.3	2% surface scab and growth cracks
Onaway (Mich.)	542	455	84	15.3	10% B size, 3% growth cracks and knobby
Merrimack (Me.)	498	453	91	18.1	6% B size, 1% growth cracks and knobby
Green Mountain	562	452	80	19.4	11% B size, 5% knobby
Keswick	475	437	92	17.0	5% B size, 1% knobby
Merrimack (USDA)	480	427	89	18.1	8% B size, 1% knobby
Katahdin	472	420	89	15.6	8% B size, 1% knobby
Delus	443	414	93	18.4	Mostly large tubers, 1.5% growth cracks
Boone	481	402	83	15.7	11% B size, 4% knobby and fusarium rot

Continued.

New Jersey table 1 continued.

Variety	Yield per acre		U.S. No.1 Pct.	U.S. No.1 Pct.	Total solids Pct.	Remarks
	Total	U.S. No.1				
	Bu.	Bu.				
Russet Burbank	514	380	74	17.4	11%	B size, 29% knobby
Irish Cobbler	449	366	81	16.0	14%	B size, 1% knobby and enlarged lenticles
Rushmore	372	294	79	15.3	10%	B size, 7% knobby and surface scab
L.S.D. 5%	62					

1/ Seed cut March 23-27 and treated with Captan 5# (50% per 100 gals.), planted April 7 and harvested September 17.

New Jersey table 2.--Potato variety test, Simonson Bros. Farm, Cranbury, N. J., 1959. *

Variety	Yield per acre		U.S. No.1 Pct.	U.S. No.1 Pct.	Total solids Pct.	Remarks
	Total	U.S. No.1				
	Bu.	Bu.				
Excel	477 ¹ / ₁	353	74	16.8	21%	B size
B926-9	667 ¹ / ₁	607	91	14.5	5%	B size, 1% knobby
50B9-8	665 ¹ / ₁	585	88	15.6	7%	B size, 3% knobby and growth cracks
B69-16	641 ¹ / ₁	558	87	16.8	11%	B size, good shape
Huron (Canada)	624 ² / ₂	443	71	17.0	19%	B size, 4% knobby
Onaway (USDA)	612 ² / ₂	545	89	15.3	4%	knobby
Saco	716 ³ / ₃	537	75	16.4	8%	B size, 14% knobby
Kasota	700 ³ / ₃	588	84	--	9%	B size, 6% surface scab rough skin
Pungo (USDA)	680 ³ / ₃	626	92	17.1	3%	growth cracks
Redburt	664 ³ / ₃	584	88	14.5	8%	B size, 3% growth cracks, poor shape
Antigo (USDA)	532 ³ / ₃	511	96	15.3	1%	knobby
Lal859 (USDA)	532 ³ / ₃	399	75	15.9	11%	knobby
Dazoc	532 ³ / ₃	458	86	15.8	11%	B size
Fl4613 "	508 ³ / ₃	457	90	16.2	7%	B size, 1% growth cracks
F5025 "	512 ³ / ₃	379	74	14.8	15%	B size, 8% poor shape
B3604-1 "	388 ³ / ₃	144	37	20.2	15%	B size, 47% growth cracks, very rough skin

*See footnote 1 in New Jersey table 1.

1/ 3 replications.

2/ 2 replications

3/ 1 replication

LSD between total mean yields calculated only for varieties with 4 replicates.

Potatoes were harvested on September 17 after all varieties had matured. Seventy-three USDA seedlings were hand-planted in 15-hill lots in the adaptability test. Fifteen of these were considered good enough to test again in 1960.

Seabrook Experiment. Twenty varieties were hand-planted in 4 single row plots. Seed was spaced 10 inches apart in 36-inch rows 40 feet long on April 23. One ton of 6-12-12 fertilizer was applied in bands by machine prior to planting.

Seed was machine cut into $1\frac{1}{2}$ -2 oz. pieces. Twenty three USDA seedlings were planted in single plots.

Temperatures averaged above normal and deficient rainfall was supplemented with 3 inches by irrigation as in the Simonson test. Potatoes were harvested as they matured from August 15 to August 25 and processed into frozen French fries within 48 hours using good commercially accepted procedures. On November 12, frozen samples were reheated in a 425°F. oven for 15 minutes and judged for color, texture and over-all appearance. The results are presented in New Jersey table 3.

New Jersey table 3.--Potato variety tests, Seabrook Farms, Seabrook, N. J., 1959

Variety	Total Yield Bu/A	U.S.1 Yield Bu/A	U.S.1 Pct.	Total solids Pct.	French fry quality
Huron	688	420	61	17.8	Fair - slightly soft
Houma	623	434	70	17.8	Rejected - Soggy
Green Mountain	558	453	81	19.0	Very good - slight color variation
Chippewa	558	409	73	15.9	Poor - slightly soggy
Teton	544	478	88	15.5	Rejected - soggy
Kennebec	484	375	78	16.7	General excellence
Excel	483	267	55	17.6	Rejected - brown discoloration & soggy
Pungo	478	374	78	17.8	Very good - slight internal discoloration
B355-35	463	292	63	16.1	Rejected - soggy
Delus	448	377	84	18.6	General excellence
Kasota	443	245	55	16.3	Poor - slightly soggy and brown
Russet Burbank	438	280	64	18.4	Fair - slight vascular discoloration
Katahdin	428	306	71	16.3	Fair - slightly soft
Boone	428	346	81	14.8	Rejected - brown discoloration
Merrimack	423	304	72	17.6	Very good
Keswick	416	351	84	18.8	General excellence
Irish Cobbler	404	256	63	16.9	Fair- slightly soft
Antigo	389	299	77	16.7	Fair- slight color variation
Plymouth	359	271	75	16.5	Poor - slightly soggy
Rushmore	324	234	72	16.5	Fair - slight graying
Navajo	Most seed rotted			16.7	Poor - slightly soggy and gray
USDA Seedlings: 1 plot only					
B4093-15	780	685	88	15.1	Rejected - brown discoloration
B4090-3	638	397	62	16.3	" "
B3626-15	580	466	80	16.1	Fair - soft
B3391-19	548	464	84	16.3	Rejected - brown discoloration
B4294-40	507	289	57	14.8	Fair - slight color variation
B3833-24	482	448	93	14.2	Rejected - brown discoloration
B3835-3	462	377	82	16.3	Poor - slightly soggy
B4132-5	417	374	90	16.1	Rejected - brown discoloration
B3653-4	378	244	64	15.3	Rejected - soggy
B3401-25	350	304	87	14.2	Rejected - brown discoloration
B3856-7	350	286	81	14.6	" "
B4294-7	447	200	45	"	" "
B4321-11	424	280	66	"	" "
B4130-13	392	104	62	"	" "
B4168-1	379	185	49	"	" "
B4168-4	339	142	42	"	" "
B4119-1	334	189	57	"	" "
B4093-20	281	182	65	"	" "
B4130-7	267	130	49	"	" "
B3401-20	266	157	59	"	" "
B3598-20	204	139	68	"	" "
B4116-2	184	160	87	"	" "
B4116-7	28	20	71	"	" and severe rot.

Dey Demonstration. The test located on the Lawrence Dey farm at Princeton Junction was planted in two-row plots 300 feet long with no replicates. The seed was spaced 9 inches apart in 34-inch rows and 2800 pounds of 5-10-10 was applied at planting. Planting was delayed until May 22, much later than recommended. The plots were harvested October 20. Yields were consequently much lower than the yields produced in the other tests. Yields were obtained from 4 thirty-two foot sections of each pair of rows and the averages are presented in New Jersey table 4. This data cannot be analyzed statistically.

New Jersey table 4.--Potato variety test, Dey Farm, Princeton Junction, N. J., 1959.

Variety	<u>Yield per acre^{1/}</u>				Remarks
	Total	U.S.	U.S.	Total	
	Bu.	No.1 Bu.	No.1 Pct.	solids Pct.	
Houma	576	536	93	17.7	2% knobby, growth cracks, slight late blight
Green Mountain	420	323	77	18.3	17% knobby, 6% B size
Chippewa	353	297	84	14.6	12% B size, no pick-outs
Katahdin	278	259	93	15.9	5% B size, no pick-outs
Plymouth	299	257	86	16.2	6% knobby & growth cracks, 7% B size
Antigo	279	257	92	14.3	7% B size, no pick-outs
Teton	289	237	82	15.6	8% knobby, 9% B size
Cobbler	307	236	77	16.1	9% knobby, 12% B size
Boone	293	217	74	15.1	16% knobby, 9% B size
Punto	269	213	79	15.8	8% knobby and poor shape
Keswick	228	210 ^{1/}	92	16.7	7% B size, no pick-outs
Kennebec	294	202	72	16.0	17% knobby, 10% B size
Russet Burbank	281	174	62	16.8	24% knobby, 12% B size
Rushmore	212	165	78	16.6	12% knobby, 9% B size
Huron (N.Y.)	241	154	64	15.8	14% knobby, 20% B size
Excel	205	150	73	16.9	3% knobby, 21% B size
Delus	165	127	77	17.4	12% knobby, 10% B size
Merrimack (Me.)	118	91	77	17.3	9% knobby, 11% B size
Merrimack (USDA)	98	78	80	--	1% knobby, 16% B size

^{1/} Averages are of 4 plots of same rows except for Keswick which had 3 plots. Cannot be analyzed statistically.

NEW YORK
L. C. Peterson and R. L. Plaisted

1959 Potato Breeding Program

Recurrent selection for high specific gravity. In 1956-57 all possible combinations of crosses were attempted among the varieties Saco, Delus, Cobbler, Merrimack, Green Mountain, and Houma. Seedlings were produced and, in 1958, these were grown in the field as single hills. At harvest time all hills were harvested and the hills of desirable horticultural type were noted. Specific gravity determinations were made on all the hills. Those not horticulturally desirable and low in specific gravity, were discarded. This procedure left one population of selections which was random with respect to specific gravity and another which had been subject to preliminary screening for specific gravity based on seedling hill performance.

In 1959 these two populations were randomized within families. These were used as the "augments" of an augmented randomized complete block design with the parental varieties, Green Mountain, Delus, Saco, Cobbler, and Merrimack serving as the replicated material. Katahdin was also replicated in this trial. Those lines with enough seed were planted in 10-hill rows both at Ithaca and at Long Island, otherwise only at Ithaca. Houma was not included since disease-free seed was unavailable. Yield and specific gravity data were recorded for all entries.

New York table 1 gives the progeny performance of these crosses. The specific gravities of the parent varieties and that of the mean of the entire progeny were greater than that of Katahdin. Of greater significance is the fact that the overall mean specific gravity of the progeny was about equal to the mean of the parent varieties when each was weighted by the frequency it occurred as a parent. An explanation for this may be that at this stage of selection specific gravity is conditioned primarily by additive gene effects. Since some dominance and epistatic effects are heritable in a tetraploid, caution is required in making an interpretation.

New York table 1.--Progeny performance, 1959.

Cross	Pedigree	Ave. progeny - Spec. gravity		No. saved as parents for second cycle
		Ithaca	Long Island	
57-1	D (X)	1.079 (8) ¹ / ₂		
-2	S x D	1.080 (10)	1.064 (4)	
-3	D x M	1.079 (64)	1.070 (27)	5
-4	M x D	1.073 (5)	1.071 (3)	
-5	GM x D	1.082 (53)	1.072 (19)	4
-6	H x D	1.081 (14)	1.069 (8)	
-8	S (X)	1.080 (13)	1.069 (9)	
-9	S x M	1.077 (82)	1.065 (73)	8
10	M x S	1.081 (15)	1.071 (21)	3
11	GM x S	1.083 (8)		2
12	H x S	1.076 (48)	1.066 (44)	
14	M (X)	1.078 (22)	1.070 (5)	
15	GM x M	1.079 (69)	1.071 (44)	6
16	H x M	1.075 (87)	1.072 (71)	7
17	C x M	1.080 (6)	1.065 (6)	
18	H x GM	1.073 (10)	1.068 (4)	
Overall Mean		1.078 (508)	1.069 (338)	

Continued.

New York table 1 continued.

Check varieties:	Ave. progeny - Spec. gravity		No. saved as parents for second cycle
	Ithaca	Long Island	
Green Mountain	1.080 (23) ^{2/}	1.075 (15)	
Merrimack	1.079 (24)	1.067 (15)	
Saco	1.077 (24)	1.067 (15)	
Delus	1.087 (16)	1.069 (7)	
Cobbler	1.079 (8)	1.072 (7)	
Katahdin	1.070 (23)	1.059 (22)	
Mean of parent varieties weighted by frequency as parents (omitting Houma & Cobbler):			
	1.080	1.068	
Unweighted Mean	1.080	1.070	

^{1/} Number of clones per progeny. ^{2/} Number of replications.

To obtain more information on this point, estimates of heritability in the broad sense were calculated. Heritability in the broad sense includes dominance, epistatic, and heredity x environment interaction effects in addition to additive effects. Since the former effects are not heritable to the same degree that additive effects are, these estimates of heritability will tend to be somewhat higher than the characteristic of which they are estimates. The analysis of the homogeneity of the progeny variances did not indicate any differences in the phenotypic variances of the several crosses. Therefore, two estimates of heritability were obtained, one pooled within progenies and the other including differences in progeny means. For this type of breeding problem the second is the more important of the two, and should be the larger. The heritability estimates are given in New York table 2.

New York table 2.--Estimates of heritability in the broad sense (expressed as percent).

	Long Island		Ithaca	
	Random population	Selected population	Random population	Selected population
Pooled within progenies	54	58	76	64
Among and within progenies	67	63	76	68

Since 236 of the randomly selected entries were grown at both locations, data from these were analyzed to obtain an estimate of the heredity x environment interaction. Using this information, an estimate of heritability of 55% was obtained. This is more conservative than the estimates presented in New York table 2 since it has been unfairly penalized by subtracting all the genotype x environment effects. It still includes dominance and epistatic effects. These calculations demonstrate that the genetic worth of an individual as a parent can be fairly well determined by its own phenotype rather than having to rely on progeny tests as is the case for yielding ability.

The correlation between the specific gravity of clones in 10-hill rows at Ithaca in 1959 and the specific gravity for the same clones in single hills the previous year was 0.36. The correlation between the specific gravity of 10-hill rows grown on Long Island and the specific gravity of the same single hills was 0.30. This low correlation is borne out in New York table 3 which shows that a selection difference of .006 units of specific gravity based on single hill performance produced a gain of only .001 units for the selections grown at Ithaca in 10-hill plots the next year. The selection difference of the Long Island grown 10-hill plots had been .005 units, but the gain was only .002 units.

New York table 3.--

	Mean of population grown at each location based on 1958 single hill performance		Mean of population based on 1959 10-hill plot performance	
	<u>Ithaca</u>	<u>Long Island</u>	<u>Ithaca</u>	<u>Long Island</u>
Random population	1.078	1.078	1.077	1.068
Selected population	1.084	1.083	1.078	1.070

Thirty-five clones were selected for parents for the next stage. The mean specific gravity of these on Long Island was 1.079 and at Ithaca was 1.088. The mean yields of these 35 were 19.2 at Long Island and 21.0 at Ithaca compared with 20.9 and 20.8 for Katahdin at the same locations. These 35 will be retested and seed from crosses involving only the top entries will be used in the next cycle.

Rate of approach to homozygosity: Selfed seeds of 56 S₁ plants were obtained. These represent eight S₀ families.

Inbreeding and testcrossing: Test crosses were made using 28 advanced New York breeding lines as females in further evaluation of lines for combining ability.

1958 Testcross results: The method of analysis of this special incomplete block design has been completed. A treatment effect was obtained for each treatment at Ithaca and at Riverhead. A treatment effect is the deviation from the grand mean of the mean yield of six replications, adjusted for block effects. The algebraic sums of these treatment effects over both locations are given in New York table 4. In order to roughly estimate the general combining ability of the several lines, the mean effect in the last column is the sum of all the adjusted treatment effects minus the tester means which were crossed to each line. From this information, the lines considered for further selfing are La1859, I 1188-2, B24-58, and I 1077-14. B2368-4 which has been reported to have good combining ability in other locations was disappointing in these two experiments.

New York table 4.--Adjusted treatment effects for yields totaled over two locations in New York.

<u>Line</u>	<u>Tester</u>						<u>Weighted ave. effect</u>
	<u>Katahdin</u>	<u>La 1859</u>	<u>B962-32</u>	<u>ND457-1</u>	<u>X96-56</u>	<u>B3131-8</u>	
I 957-1		4.74	10.03	0		-2.30	3.37
I 1015-2	.37	14.49	3.81	-7.30		1.32	2.90
I 1077-16	-.16	1.36	.56			-4.35	-.59
I 1077W28-5	-2.16	.57	-1.38	2.07	9.90	-1.62	1.70
I 1114-2	-1.02	-9.64	2.74	-1.38	-5.91	-12.04	-4.07
Early Gem	4.79	7.51	1.17	7.48	-2.90	-4.94	2.66
B 1396-N2	-5.98	7.16	.79	5.39	-1.70	1.06	1.60
B 2938-22		-10.53		4.05			-4.20
B 2903-17		1.29					-2.20
I 1188-2	-1.61		6.34		2.10	8.11	4.93
B 922-3	-.10	3.96	-3.19	1.01	9.98	-2.83	1.95
B 922-6	1.59	4.98	-.83	-2.95	-9.40		-1.12
B 2834-3	-.96	6.55	-2.17	-.42		2.85	1.53

Continued.

New York table 4 continued.

Line	Tester						Weighted ave. effect
	Katahdin	La 1859	B962-32	ND457-1	X96-56	B3131-8	
B 3014-10	-3.65	10.17	1.27	-7.36			.11
B 3097-16		6.25	1.52	2.03			3.00
B 3131-N2	-2.03	-.80	-.29	4.03			.23
B 3428-31			-3.18			.86	.30
B 3428-41	-8.21	4.33	-7.33	-9.29		-15.37	-6.81
B 3556-12	-.90	5.82	-1.41	-3.86	-4.87	-2.27	-.77
PI 194665		4.48	3.46	2.18	-2.09	1.68	2.35
La 1859	-.89		9.63	3.28			5.17
ND 457-1	.96	6.64	-3.97				.69
OB 2905-1	-1.53	7.38		-4.04		-1.93	.14
PI 214372-1		3.55	-3.76	-7.81	4.51	-2.57	-.81
PI 214372-2	5.29	-1.46	4.70		1.60		2.40
Picha51 1-53-15	.32	7.67	-.72	-9.44			-.54
I 1049-3	.60	6.08			-7.47		-.81
I 1092-2		9.83		-.21	-.83	.98	2.68
I 1165-14	.48	-6.06	-16.09	-.33	1.39	-.58	-3.06
I 1216-1	-4.66	6.13	-.76	-8.15	-11.24		-3.53
B 605-10	-.66	9.66	1.58		-7.97	-5.25	-.27
B2368-4	1.95		1.60	-8.53	.70	.68	.55
B 3131-8	1.86	-2.09	-6.08	-7.78	-.49		-2.71
B 3556-1	4.72	6.63	-5.63	-.15			1.39
X927-3	-1.20	7.39	-2.40	-3.98	-5.87		-1.26
AC 25953	2.57	.60	2.61		-1.11		1.04
Neb 154-57-2			-5.93	-7.84			-5.54
OB 3596-1		2.18					-1.31
Earlaine	-6.57	3.15		-6.33	-14.99	-9.45	-6.49
Katahdin		-6.17	-3.58		-4.09		-5.06
Osage	-5.79	-4.15	-3.74	3.65	15.34	1.81	1.66
Redkote		13.27	-9.19			-2.81	.24
I 1077-14	3.70		-7.88	7.59	1.11	5.54	3.28
B 24-58		7.91	-3.75	4.34	8.00		4.18
PI 214371-2	-6.78	-4.88			-.73		-4.68

Check variety treatment effects:

Katahdin	.61	B962-32	-4.10	Cobbler	9.67
Merrimack	-3.01	Cherokee	3.12	Saco	23.45
La 1859	14.83	X96-56	-.11	Red Pontiac	12.71
				Sebago	.83

Golden Nematode: Resistance determinations were made at the Nematode Laboratory at Seaford, L.I. Duplicate samples of each seedling were tested. As usual, assays were made of the potting soil to determine the population and viability of the cysts. Plants were grown in four-inch pots. After a period of 6-7 weeks of growth, the soil-ball of each seedling was examined for cysts and susceptible individuals eliminated. Results obtained attest to the accuracy of the method of inoculation.

S. vernei is a diploid species and, in general, a difficult one with which to work. In some ways it is the better of the two sources of resistance being used. Attempts to incorporate its resistance into the program have been successful in a few cases. Seedlings in the second backcross are being assessed

for their horticultural characters. In 1958, 600 seedlings were grown in single hills. Of these, 64 were selected and grown in 10-hill plots in 1959. Ten were selected for further trial in 1960. These selections compared favorably with Katahdin in both yield and specific gravity. There was a tendency, however, for them to be a bit rougher in appearance than Katahdin.

S. andigenum: Four collections of this species have been used extensively in the program. One, our number 1376, appears to be the best of the group. Fertile pollen, ease of handling, and resistance to the nematode controlled by a single dominant factor explains the extensive use of this species. In 1958, 18,000 seedlings were grown as single hills and 850 were selected on a horticultural basis, for further trial. When these were tested in 1959, 463 were found to be resistant to the nematode. About 150 were saved for further evaluation. In appearance, weight and specific gravity, many of the selections compared favorably with Katahdin.

	Range in wt.			Range in spe-	Ave. spe-
	lbs.	10-hills	Ave. wt.	cific gravity	cific gravity
Katahdin	11	= 35.6	23.4	1.053 - 1.076	1.067
Vernei selections	14.5	= 33.2	24.4	1.071 - 1.083	1.076
<u>Andigenum</u> selections	8	= 37.5	22.7	1.054 - 1.090	1.070

It has been shown that growing resistant selections in infested land, stimulated cyst germination and a resulting reduction of the nematode population in the soil. Virulent strains of the nematode, known to exist in the British Isles, have not been found, as yet, in New York State.

Black Spot: The procedure used in evaluating seedlings for black-spot resistance is the same as reported in previous years. Seedlings are grown and stored on Long Island. Bruising and rating for color intensity is done at the Research Station at Riverhead by the Department of Vegetable Crops.

One hundred and twenty-seven selections, grown on Long Island, were saved for the black-spot bruising test. Of the entires included in the Regional Trials (Table 5), 13 are classed as resistant to black-spot. Eight of these, 1335, I80-1, I80-2, IWU-1, JDN-9-JDS-1, JAQ-1 and HXS-4 are older selections and have been tested for black-spot resistance for at least four consecutive years.

Blight and Scab: The best selections developed in one phase of the program have been used as parental materials in other phases of the program. This is particularly true with blight and scab selections. Many seedlings possessing resistance to the golden nematode or to black-spot also are resistant to scab or blight.

These hundred and nine selections were tested for scab resistance. While a relatively high percentage were classed as resistant, most were discarded on a horticultural basis. Seven selections included in the Regional test (table 5) are resistant to scab and seven resistant to blight.

New York table 5.--Potato regional yield trials, 1959.

Entries	Tompkins			Cortland			Madison			Allegany			Suffolk		
	Yield/ Total	Over 2"	Spec. grav.	Yield/ Total	Over 2"	Spec. grav.	Yield/ Total	Over 2"	Spec. grav.	Yield/ Total	Over 2"	Spec. grav.	Yield/ Total	Over 2"	Spec. grav.
14V119-4	52.5	50.0	1.081	41.2	39.5	1.084	32.9	29.7	1.084	22.4	20.9	1.091	44.8		1.058
Smooth Rural	64.1	57.2	1.079	65.5	57.8	1.080	79.1	76.1	1.085	38.2	32.0	1.087	64.6		1.067
14V141-1	83.3	76.2	1.082	54.3	51.7	1.090	78.4	75.4	1.083	40.2	35.6	1.092	94.5		1.065
JGQ-1	55.9	53.9	1.070	62.3	57.3	1.082	65.3	62.9	1.071	40.6	39.4	1.084	57.2		1.056
Green Mount.	63.3	58.0	1.080	60.8	57.5	1.081	65.5	61.8	1.085	46.6	40.8	1.088	78.9		1.072
IWU-1	55.1	52.4	1.071	54.0	49.6	1.081	77.6	74.9	1.079	27.1	24.7	1.090	63.8		1.062
1335	76.6	68.9	1.076	51.1	46.0	1.079	74.1	71.7	1.080	41.1	40.0	1.095	69.3		1.061
JDS-1	54.4	49.8	1.075	44.7	42.4	1.084	51.7	49.6	1.076	30.0	28.4	1.086	47.7		1.057
ISO-1	53.1	50.4	1.072	39.7	37.4	1.081	58.1	56.6	1.075	35.9	34.0	1.084	66.4		1.062
15V124-1	65.7	65.0	1.080	42.6	41.5	1.086	63.0	61.8	1.080	41.4	40.0	1.097	74.7		1.066
KIR-3	43.1	37.7	1.066	35.7	32.7	1.070	51.4	48.6	1.064	31.8	27.9	1.083	32.0		1.055
KLS-1	47.3	44.1	1.068	30.4	29.5	1.075	54.9	54.0	1.074	29.2	28.2	1.084	33.8		1.061
Katahdin	59.0	56.5	1.073	48.2	46.2	1.083	57.0	55.0	1.074	33.6	31.3	1.089	53.0		1.061
JDN-9	45.0	40.9	1.084	26.7	26.2	1.087	51.5	47.5	1.078	30.6	26.9	1.091	42.6		1.060
HXS-4	75.4	64.9	1.080	61.2	55.1	1.079	75.7	72.1	1.076	41.9	38.3	1.090	47.8		1.058
KLK-5	59.7	58.4	1.074	60.6	56.2	1.078	63.6	60.8	1.067	39.2	36.5	1.091	66.5		1.058
KLS-13	60.3	59.5	1.078	48.9	47.9	1.078	56.0	54.8	1.076	36.7	34.5	1.091	76.7		1.069
ISO-2	59.8	57.7	1.073	49.7	48.6	1.082	66.0	63.8	1.074	41.2	37.9	1.088	70.1		1.060
JCR-9	48.5	46.0	1.079	45.9	43.9	1.085	58.6	56.0	1.080	37.4	35.9	1.093	37.9		1.053
KPD-3	49.1	47.8	1.075	26.6	25.5	1.071	53.6	52.7	1.074	32.4	31.3	1.091	57.3		1.060
15V68-1	62.5	55.9	1.082	42.8	39.4	1.089	80.6	76.2	1.083	37.3	32.1	1.092	59.7		1.068
KLS-10	52.5	50.7	1.073	53.2	49.6	1.083	52.5	49.0	1.075	36.9	33.6	1.084	56.7		1.062
JZG-5	44.5	38.8	1.086	42.8	37.7	1.094	52.3	45.6	1.091	27.8	21.3	1.097	44.6		1.071
Cobbler	53.8	48.7	1.081	66.8	64.6	1.083	41.9	39.2	1.072	37.3	32.0	1.083	59.9		1.060
KBW-8	62.9	60.6	1.078	46.1	42.0	1.087	67.3	62.9	1.080	43.0	33.0	1.091	62.4		1.060
Average	57.9	54.0	1.077	48.0	45.0	1.082	61.2	59.2	1.078	36.0	32.7	1.089	58.5		1.062

1/ Yield = Pounds of potatoes from 3 plots each 10 feet long.

NEW YORK (Long Island)

Richard L. Sawyer

Potato Variety Trials On Long Island

Variety trials were planted on April 13 and May 13 using a randomized block design with six replications. Plots were single rows 30 feet long. There was a 34-inch spacing between rows and seed was spaced 10 inches apart within the row. Fertilization contained 2,500 pounds of a 7-7-7 analysis with $2\frac{1}{2}$ percent magnesium oxide. Sawyer table 1 contains the data for the 1959 growing season. Sawyer table 2 contains the storage data for the 1958-59 season, the field data having been previously presented in the 1958 report.

As indicated in Sawyer table 1, Cobbler out-yielded Plymouth, but Plymouth had a superior specific gravity. Kennebec continued to out-yield Katahdin, and Katahdin continued to out-yield Merrimack. None of the newer entries looked particularly promising. Under the wet conditions of this growing season Huron did not stand out as in previous seasons.

The storage results given in Sawyer table 2 indicate that Huron is not a good storage variety. It has a short rest period and high storage shrinkage, with considerable susceptibility to black spot. Plymouth does not appear to have good storage characteristics.

Kennebec, Katahdin, Delus, B 3428-41 and Tawa gave good chipping color from early plantings. Katahdin and Delus did not look as good in the late planting. Taking into consideration yield and storage life, Kennebec had the most promise as a processing variety for Long Island.

Black spot was considerably reduced in the May planting as compared to the April planting with almost all varieties. Saranac had practically no black spot with late planting. Huron and Delus had a high reading in both the early and late plantings.

Sawyer table 1. Yield and specific gravity data for 1959 potato variety trials.

Variety	April Planting			May Planting	
	U.S.	2-3 $\frac{1}{2}$	Specific gravity	U.S.	2-3 $\frac{1}{2}$
	No.1			No.1	
	Cwt.	Cwt.		Cwt.	Cwt.
Katahdin	267	192	1.081	230	195
Merrimack	226	183	1.080	194	187
Cobbler	314	266	1.074	258	245
B 73-3	107	107	1.080	136	136
Kennebec	328	250	1.080	292	241
Delus	192	147	1.080	163	149
Green Mountain	294	270	1.083	231	229
Antigo	262	184	1.072	193	184
Plymouth	261	206	1.077	209	200
Mohawk	268	226	1.083	217	190

continued

Sawyer table 1, continued.

Saranac	255	230	1.078	199	193
Huron	239	235	1.079	238	233
1335	175	164	1.076	201	190
Osage	135	135	1.069	128	127
606	233	224	1.080	211	195
L.S.D. 5%	47	37		50	41
L.S.D. 1%	65	51		69	55

Sawyer table 2. Storage data for 1958 potato variety trials for both early and late plantings.

Variety	Black spot index <u>1/</u>		Specific gravity		Chipping color <u>2/</u>		Shrinkage		Sprouts per kilogram of tuber	
	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late
									grams	grams
Merrimack	33	19	1.076	1.079	5.5	5.5	7.7	6.9	2.2	1.6
B 3427-7	38	20	1.067	1.067	2.5	3.2	9.4	7.7	9.7	9.0
Kennebec	42	13	1.078	1.077	6.7	6.5	9.2	7.4	7.5	3.2
Cobbler	26	14	1.076	1.071	4.7	4.2	8.2	5.7	13.9	5.9
B 3428-41	1	14	1.072	1.071	6.0	6.0	9.3	6.8	15.8	11.2
B 605-10	23	13	1.072	1.074	2.7	3.0	8.9	8.0	14.1	10.7
Saranac	36	1	1.061	1.064	4.0	3.5	9.6	8.7	13.6	11.3
B 926-9	19	20	1.062	1.060	2.3	4.3	10.1	10.1	18.6	15.1
Katahdin	27	18	1.072	1.067	6.2	4.7	8.0	7.3	11.8	9.3
Delus	39	44	1.085	1.082	6.3	5.2	7.1	6.6	6.1	5.9
B 73-3	37	6	1.079	1.079	3.5	4.5	9.2	6.4	8.5	3.0
B 2368-13	53	19	1.072	1.072	3.5	4.5	9.7	8.3	14.1	10.7
G. Mountain	40	29	1.086	1.084	2.0	2.2	9.8	8.3	14.9	7.0
B 2894-24	27	8	1.071	1.070	5.7	5.2	10.3	8.5	7.5	6.2
Plymouth	24	22	1.076	1.075	4.5	5.3	8.4	7.5	16.4	11.4
Huron	57	33	1.079	1.076	1.8	1.3	15.1	13.1	13.5	11.9
Mohawk	26	9	1.083	1.080	5.5	3.0	8.3	6.8	10.9	5.0
Tawa	20	7	1.069	1.069	6.0	6.5	12.4	9.8	30.5	25.2
L.S.D. 5%	12.9	11.9	.003	.004	1.2	1.1	1.6	1.3	4.2	2.5
L.S.D. 1%	17.1	15.8	.003	.005	1.6	1.5	2.1	1.8	5.5	3.4

1/ Index scale: 0 - 90 taking into consideration percent showing blackening and intensity.

2/ Index scale: 1 - 9 with 9 light and 5 the darkest possible for commercial acceptance.

NEW YORK
Elmer E. Ewing and Ora Smith
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Five potato variety trials were conducted in four New York counties in cooperation with the respective County Agricultural Extension Service agents. All plots were located in commercial potato fields and were cared for by the growers. Two experiments in Monroe County and the experiments in Wyoming and Franklin Counties were on mineral soils. The fifth trial, in Steuben County, was on muck soil.

Certified seed of Norland was obtained from Dr. R. H. Johansen, Fargo, North Dakota; certified seed of Blanca and Navajo from Dr. J. G. McLean, Greeley, Colorado; and certified seed of Huron, Russet Rural, Merrimack, Sebago, and Irish Cobbler from various New York growers. Profs. L. C. Peterson and R. L. Plaisted furnished seed of the following Cornell University lines: ISO-1, JGQ-1, JDS-1, ISO-2, JDN-9, and the "source 1" seed of 13-35 which was planted on the Dunn farm in Monroe County. Other 13-35 seed was obtained from a local certified seed grower and suffered some chilling injury during shipping. Seed of the remaining varieties came from the USDA Station at Presque Isle, Maine.

Each experiment was composed of four randomized complete blocks. Individual plots consisted of single rows 25 feet long. Row spacings were 34 inches between paired (planter) rows and 36 inches between unpaired rows. Seedpieces were spaced 8 inches apart.

Yields from individual plots were weighed before and after grading. Potatoes from the Monroe County trial, Hopkins farm, were graded over a 2-inch chain; 1-7/8-chains or spools were used at the other locations. Potatoes over four inches in diameter and potatoes failing to meet U.S. No. 1 grade specifications were picked out at all locations, except Franklin County. There "scabby" tubers were included in No. 1 weights because of the unusual prevalence of scab. Samples were selected from the No. 1 tubers in each plot for specific gravity determinations, and the specific gravity readings were converted to percentages of dry matter.

Selected tubers from a single replication in each experiment were chipped within a few weeks after harvest. Potatoes at all locations except Franklin County were chilled somewhat prior to digging and/or while in growers' storages. Consequently only the Franklin County trial gave light-colored chips. Chip color was measured by a Hunter Color and Color Difference Meter. Meter readings above 17.0 are generally considered to indicate satisfactory chip color; readings below 17.0 are considered too dark.

Analyses of variance were performed on the data for total yields, yields of U.S. No. 1 potatoes, and specific gravities. Specific gravities of a number of samples were less than 1.057 -- too low to be measured with the "potato hydrometer." For computing means, 1.057 was used in such cases and the means -- marked "<" in N. Y. tables 1 through 5 -- were not included in the analyses of variance. Significant differences among means were determined by Tukey's Test. Those differences exceeding the "d" values given in the respective tables are significant at odds of 19:1. Chip color values represent the means of two determinations.

Twenty-five tubers were drawn at random from each plot in the Franklin County trial and individually rated for size and type of scab lesions present.^{1/} Rating scales used are described in footnotes under N. Y. table 7. The mean ratings obtained from the 25 tubers in each plot were subjected to analysis of variance. Results are shown in N. Y. table 7. To obtain an overall rating which would reflect both the size and type of scab lesions present, the scoring system shown in N. Y. table 6 was employed. Mean scored for each plot were transformed logarithmically and then subjected to analysis of variance. (The transformation was necessary to give homogeneity of variance.) The overall scores are also presented in N. Y. table 7.

The 1959 season was extremely hot and dry. At all locations except Wyoming County yields and specific gravities were low, especially for the later maturing varieties. A prolonged period of unusually hot weather late in September when the early varieties had already died down may have been partly responsible for the relatively poor performance of the later varieties.

The pH of the soil in the Franklin County trial was only 4.7, but scab has been a problem in this field for several years. Scab was very prevalent there during the 1959 season, affording an excellent opportunity to evaluate the scab resistance of the thirteen entries in the trial. Of 100 Irish Cobbler tubers selected at random from the four replications, none was free from scab lesions; and many were so covered with deep pitted lesions that hardly any skin remained. In contrast, about one-fifth of the Blanca and Plymouth tubers were completely free from scab lesions, and most of the other tubers had only superficial lesions.

Plymouth continues to show promise especially where scab is a problem, and will be recommended in 1960 to growers who want a scab resistant variety. The outstanding new entry in the 1959 trials was Norland, which yielded well at all three locations in which it was planted (N. Y. tables 1, 4, and 5) and showed fair scab resistance (N. Y. table 7). Tuber size and shape were excellent. However, the variety should probably be grown only for early market, since it gives very low total solids.

Yields of Navajo and Blanca were not meaningful because seed was cut too small and poor stands resulted. The specific gravities and chip color looked promising, and Blanca had excellent scab resistance. Both varieties will be tested more thoroughly in 1960. Huron exhibited only a little more scab resistance than Kennebec, gave many poorly shaped tubers, and did not rank high for either yields or total solids.

The greatest disappointment in these trials was the performance of C.U. 13-35, which had shown promise during 1958. It proved to be very susceptible to heat sprouting, a defect which was present in the variety at all five locations. ISO-1 and JGQ-1, especially the former, compared favorably with Katahdin in yield, tuber appearance, and total solids. Since both varieties are reported to have resistance to black-spot and late blight they will be tested again in 1960. None of the other numbered varieties performed well enough to warrant further testing in New York.

N. Y. tables 8-11 give the mean Rd values for chip colors from the 1958 variety trials.

^{1/} The authors wish to express their gratitude to Prof. E. D. Jones who rated the tubers for scab and suggested the overall scoring system shown in N. Y. table 6.

New York table 1.--Potato variety trial, Monroe County (Dunn Farm), 1959.

Variety	Yield per acre				Chip color Ave. Rd	Remarks
	U.S. No.1	Total	U.S. No.1	Solids		
	Cwt.	Cwt.	Pct.	Pct.		
Norland	239	267	89.4	<15.5 ^{1/}	12.5	Shallow eyes, good appearance. Some second growth (not serious).
Plymouth	230	254	90.7	18.9	13.0	Generally good appearance. Main defect off-shape (not serious).
13-35(Source 1)	220	327	67.3	17.4	16.1	Poor appearance. Heat sprouting, second growth very prevalent.
13-35(Source 2 ^{2/})	211	298	70.6	16.8	9.9	Poor appearance. Heat sprouting, second growth very prevalent.
Irish Cobbler	209	267	78.2	18.4	14.6	Rough appearance. Many pick-outs due to off-shape.
Tawa	193	228	84.9	17.9	26.8	
D .05 (Tukey)	47	58		1.2		
Merrimack ^{3/}	233	284	82.2	19.7	19.1	Main defect was off-shape.
Sebago ^{3/}	238	270	88.1	17.4	24.6	

1/ Total solids of Norland less than 14.8% in one replication.

2/ 13-35 seed from Source 2 was chilled in transit.

3/ Merrimack and Sebago were from a different experiment in an adjacent part of the field. Yields are means from six replications, total solids from four replications.

Planted May 21, harvested October 21.

New York table 2.--Potato variety trial, Monroe County (Hopkins Farm), 1959.

Variety	Yield per acre				Chip color Ave. Rd	Remarks
	U.S. No.1	Total	U.S. No.1	Solids		
	Cwt.	Cwt.	Pct.	Pct.		
Kennebec	132	231	57.1	<15.1 ^{1/}	12.2	Off-shape and sun-burn serious.
Delus	132	181	72.9	16.6	14.6	Tubers generally large. Main defect was off-shape.
Katahdin	131	208	63.1	<<15.3 ^{2/}	12.5	Sun-burn most common defect, also many off-shape.
Huron	118	212	55.8	15.4	5.8	Some heat sprouting. High percentage off-shape.
13-35	117	247	47.4	15.3	11.2	Heat sprouting severe. Many off-shape.
Navajo	108	154	70.3	17.7	25.3	Uniform size and shape, eyes medium to shallow.
D .05 (Tukey)	76	65		1.5		

1/ Total solids of Kennebec less than 14.8% in one replication.

2/ Total solids of Katahdin less than 14.8% in two replications.

Planted May 21, harvested October 21. Fertilization: 2,000 lbs. 8-16-16 in bands at planting.

New York table 3.--Potato variety trial, Wyoming County, 1959.

Variety	Yield per acre			Solids Pct.	Chip color Ave. Rd	Remarks
	U.S. No.1	Total	U.S. No.1			
	Cwt.	Cwt.	Pct.			
Kennebec	357	407	87.7	18.8	19.7	Sun-burn quite prevalent.
Russet Rural	323	339	95.3	19.3	11.3	Little sun-burn.
B 355-35	321	352	91.3	17.9	12.2	"Cat-face" serious.
13-35	321	354	90.6	18.5	8.2	Heat sprouting fairly serious, shape fair.
Katahdin	305	342	89.0	17.3	11.8	Sun-burn quite prevalent.
ISO-1	305	344	88.5	18.0	10.6	Similar to Katahdin in appear- ance, and amount of sun-burn.
JGQ-1	282	319	88.5	17.8	12.9	Medium tuber appearance.
JDS-1	269	292	92.3	17.6	10.9	Very smooth appearance, nice shape. Sun-burn prevalent.
B 3696-13	241	274	87.9	18.8	8.4	Shallow netting. Only fair shape.
Delus	233	249	93.8	21.5	14.3	Some tendency to air crack. Early maturity.
B3140-36	163	182	89.5	18.6	8.3	
D .05 (Tukey)	106	111		1.5		Sun-burn similar to Katahdin.
ISO-2 ^{1/}	266	315	84.4	17.7	14.7	
JDN-9 ^{2/}	233	281	83.0	19.3	10.8	"Cat-face" rather serious.
Merrimack ^{2/}	251	262	95.7	20.5	15.4	General appearance rough.

^{1/} ISO-2 was present in only two replications.

^{2/} JDN-9 and Merrimack were present in only one replication.

Planted May 28, harvested October 16.

Fertilization: Manure plowed down plus 2,000 lbs. 6-12-12 in bands at planting.

New York table 4.--Potato variety trial, Steuben County (muck soil), 1959.

Variety	Yield per acre			Solids Pct.	Chip color Ave. Rd	Remarks
	U.S. No.1	Total	U.S. No.1			
	Cwt.	Cwt.	Pct.			
Kennebec	239	300	79.6	17.7	15.6	Sun-burn serious, also russet scab.
Norland	204	254	80.2	14.8 ^{6/}	12.9	Good shape. Some russet scab.
Plymouth	193	232	83.1	16.3	8.2	Sun-burn serious. Stem-end browning in most tubers.
ISO-1	151	193	78.4	15.6	10.3	White skin. Tuber shape regular, good.
Delus	150	173	87.0	18.3	11.9	Some hollow heart in larg- est tubers.
Irish Cobbler	138	186	74.3	15.4	9.6	Very rough appearance. Stem- end browning in most tubers.
Katahdin	133	170	78.5	15.4 ^{7/}	10.9	Heat sprouting.
13-35	132	157	83.9	15.7	7.7	
Huron	126	172	73.2	15.3 ^{7/}	9.9	Very white skin, but shape not good.
Tawa	122	144	84.4	15.8 ^{7/}	15.1	Russet scab prevalent.
B 3454-5	37	67	55.0	15.1	11.4	Red skin. Very small.

Continued.

New York table 4 continued.

Variety	Yield per acre		U.S. No.1 Cwt.	U.S. No.1 Cwt.	U.S. Pct.	Solids Pct.	Chip color Ave. Rd	Remarks
	U.S.	Total						
	No.1	Total						
D .05 (Tukey)	67	72				1.2		
JGQ-11/	142	175	81.3			15.7	13.8	Good tuber appearance.
Osage2/	98	116	85.0			16.8	13.1	Very good appearance. Elongated. Tan skin.
JDS-13/	162	209	77.7			16.0	13.7	Good tuber appearance.
Blanca3/	82	117	70.3			16.3	11.1	
B 3172-134/	69	125	55.5			17.0	10.2	
Navajo5/	61	80	76.8			15.9	18.1	Round. Shallow eyes. Good appearance.

1/ There were three replications of JGQ-1; 2/ There were two replications of Osage; 3/ JDS-1 and Blanca were each present in one replication; 4/ B 3172-13 was from a guard row (damaged by sprayer tracks); 5/ Navajo yields not included in A.N.O.V. due to poor stands; 6/ Total solids of Norland less than 14.8% in all four replications; 7/ Total solids of Katahdin, Huron, and Tawa less than 14.8% in one replication.

Planted June 9, harvested Oct. 13. Fertilization: 2,000 lbs. 5-10-10 in bands at planting.

New York table 5.--Potato variety trial, Franklin County, 1959.

Variety	Yield per acre		U.S. No.1 Cwt.	U.S. No.1 Cwt.	U.S. Pct.	Solids Pct.	Chip color Ave. Rd	Remarks
	U.S.	Total						
	No.1	Total						
Katahdin	220	254	86.8			16.0	33.0	
Norland	212	238	88.9			14.84/	17.0	Smooth, regular. Med. red skin. Good size. Seemed esp. susc. to black scurf.
B 3604-16	205	231	88.5			15.14/	14.7	Rather deep eyes; "cat-face" prev. Internal necrosis serious.
Kennebec	189	226	83.4			15.25/	28.1	Irregular shape. More growth cracks and off-shape than Katahdin.
Irish Cobbler	182	222	82.0			16.1	21.1	Many misshapen tubers.
13-35	173	260	66.8			16.4	14.1	Heat sprouts, almost every tuber.
Tawa	167	213	81.7			16.4	28.4	Main defect was growth cracks. Stem-end browning rather severe.
Huron	155	193	80.2			17.1	20.3	Irregular shape.
Plymouth	152	185	82.0			18.1	25.7	Medium smooth, regular tubers. More crack growths than Katahdin.
B 4094-21	113	160	70.3			15.15/	27.8	Elongated, strongly netted. Growth cracks very severe.
D .05 (Tukey)	63	65				2.1		
Navajo2/	96	117	81.8			17.4	24.2	Small, round, smooth. Tan skin. Some internal necrosis.
Blanca3/	159	201	78.8			17.3	27.5	
Osage3/	155	179	86.9			17.8	30.8	Elongated. Smooth, regular.

1/ Due to prevalence of scab, this defect was not picked out (see table 6).

2/ Yields of Navajo were not reliable due to small seedpiece size and poor stands.

3/ Blanca and Osage were present in only two replications.

4/ Total solids of Norland and B 3604-16 less than 14.8% in two replications.

5/ Total solids of Kennebec and B 4094-21 less than 14.8% in one replication.

Planted May 27, harvested Sept. 29. Fertilization: 1,250 lbs. 8-16-16 in bands at planting. Side-dressed with 100 lbs. NH_4NO_3 plus 500 lbs. 5-10-10.

New York table 6.--Table for obtaining scab scores.

Type Area	Surface or russet	Raised, slightly pitted	Pitted	Deeply pitted
Trace	1	2	6	10
1-10 %	2	4	12	20
11-20 %	4	8	24	40
21-40 %	6	12	36	60
41-60 %	10	20	60	100
61-100%	14	28	84	140

New York table 7.--Scab ratings, Franklin County, 1959.

Variety	Type of lesion ^{1/}	Area ^{2/}	Overall score ^{3/}
Plymouth	1.30	2.06	4.7
Norland	1.57	3.29	9.2
B 3604-16	1.77	3.32	12.7
Tawa	1.93	3.40	16.7
Navajo	1.98	4.27	19.0
Huron	2.09	3.76	20.4
Kennebec	2.23	4.40	29.0
13-35	2.54	4.00	39.6
Katahdin	2.63	4.36	41.6
Irish Cobbler	2.94	4.98	62.9
B 4094-21	3.40	4.12	70.9
D .05 (Tukey)	0.55	1.28	
Blanca ^{4/}	0.98	1.98	4.2
Osage ^{4/}	1.58	3.00	8.4

- 1/ Most severe lesion present, where 1 = surface or russet scab; 2 = raised and slightly pitted; 3 = pitted; 4 = deep pits. (Variety means are from 4 replications with 25 tubers rated in each replication.)
- 2/ Rated according to percent of surface covered, where 1 = trace; 2 = 1-10%; 3 = 11-20%; 4 = 21-40%; 5 = 41-60%; 6 = 61-100%. (Variety means are from 4 replications with 25 tubers rated in each replication.)
- 3/ Obtained by entering N.Y. table 6. Bracketed values not significantly different at .05 level. (Tukey's test).
- 4/ Blanca and Osage, each present in only two replications, are not included in the analyses of variance.

New York table 8.--Wayne County (Muck soil). Chip colors, 1958 trials.

Variety	From field	After 11 wks. at 40°F. and 9 wks. at 75°F.	After 22 wks. at 50°F.
Cherokee	18.1	14.8	10.8
B 3453-2	13.3	12.6	20.6
B 2368-4	19.0	17.2	15.6
Redbake	16.7	8.1	18.6
Plymouth	15.4	7.5	19.7
Tawa	19.1	16.5	11.8
Ontario	13.0	5.3	15.6
Katahdin	16.5	8.7	14.3
Red Pontiac	12.0	14.0	15.8
Irish Cobbler	14.4	12.1	14.0
B 920-7	8.4	8.0	6.7

New York table 9.--Wyoming County. Chip colors, 1958 trials.

Variety	From field	After 11 wks. at 40°F. and 9 wks. at 75°F.	After 22 wks. at 50°F.
Saco	16.1	27.8	17.1
Merrimack	23.5	16.1	19.5
Delus	21.1	15.9	17.5
Russet Rural	23.0	18.3	23.4
Katahdin	23.2	20.7	18.9
Kennebec	13.4	21.6	17.6
13-35	13.1	11.8	13.0
B 2368-4	8.9	15.5	13.7
Redbake	17.4	16.7	17.5
B 3427-7	20.8	8.1	9.4
B 605-10	18.3	12.1	18.8
B 920-7	17.2	5.8	21.8

New York table 10.--Steuben County. Chip colors, 1958 trials.

Variety	Chip color, Ave. Rd		Variety	Chip color, Ave. Rd	
	From field	After 26 wks. at 50°F.		From field	After 26 wks. at 50°F.
Delus	22.8	16.1	Redbake	23.3	12.5
Merrimack	27.2	14.6	13-35	16.3	9.2
Russet Rural	19.8	17.7	Plymouth	17.8	13.3
Irish Cobbler	24.2	14.8	B 605-10	26.2	11.7
Russet Burbank	21.8	23.4	Katahdin	39.7	11.6
Kennebec	25.8	18.9	Tawa	23.6	19.9
Saco	21.8	12.3	Sebago	28.9	20.2
White Cloud	27.5	18.4	B 3427-7	16.6	8.5
			B 2368-4	21.6	10.2

New York table 11.--Broome County. Chip colors, 1958 trials.

Variety	From field	After 11 wks. at 40°F. and 9 wks. at 75°F.	After 22 wks. at 50°F.
Saco	3.6	13.6	6.9
Delus	4.5	17.5	11.8
Russet Burbank	9.8	22.4	13.3
Merrimack	4.8	17.5	12.1
Kennebec	4.5	10.3	14.5
Irish Cobbler	4.6	18.8	6.9
Redbake	10.6	19.3	13.6
13-35	3.3	12.2	5.7
Sebago	11.2	5.5	11.5
Katahdin	4.2	15.4	10.8
Russet Rural	4.6	18.0	8.1
Tawa	3.7	15.3	7.8
Houma	5.0	11.4	8.6
Plymouth	2.7	14.8	5.3
Dazoc	3.9	14.3	5.2
Red Pontiac	2.6	9.2	4.6

NORTH DAKOTA

Robert Johansen, A. P. Benson, and E. P. Lana

The problem, objectives, and plan of work in potato breeding for North Dakota are similar to those reported in the 1951 report.

Potato Crossing Program

During March and April, 1959, 496 crosses and several selfs were made in the Horticulture greenhouse. The objective of most crosses was to combine disease resistance (late blight, scab, virus X and Y, etc.) with good tuber type, red color, yield, and quality. Several USDA parents possessing multiple disease resistance were used in the 1959 crossing program.

Greenhouse and Field Seedlings

Approximately 20,000 seedlings representing 221 families were grown in the greenhouse during the summer and fall of 1959. Seedling progenies having late blight resistance were inoculated and screened for resistance to race "O" of late blight.

At the Langdon Experiment Station, approximately 18,000 seedlings were grown in the field for progeny selections and study. Thirteen seedling families representing approximately 1000 seedling tubers derived from crosses made by Mr. Ben Picha, Grand Forks, North Dakota, were also grown for seedling selections. A severe hailstorm on August 5, combined with severe drought conditions during the first two weeks of August, caused the seedling yields and size to be very small.

Advanced Selections

At the Langdon Experiment Station, 865 advanced selections were grown under isolated conditions in five-hill plots or larger. Seed stocks harvested from Langdon will be used for further increase and testing. Additional samples of the 865 advanced selections were grown and tested in scab and adaptation plots at Park River, Fargo, Northwood, and Grand Forks. Thirty-seven second-year clones selected from seedling populations grown at Park River in 1958 were again grown at Park River during 1959. The purpose of this planting was to grow and select seedlings that possess high resistance to russet scab and silver scurf. Eight clones were selected from this planting in 1959. Several selections and varieties from other States and Canada were grown in adaptation plots at Grand Forks and Park River.

During 1959, seed stocks of several promising advanced selections were distributed and grown by 14 foundation potato growers in the Red River Valley, and 8 foundation growers in Golden Valley County (Beach, N. Dak.). Selections distributed to Foundation growers in 1959 were as follows: ND 4122-2, ND 3324-2, ND 3740-11, ND 3815-1R, ND 3631-6R, and ND 3631-5R.

A summary of selections and seedlings grown and those saved for further study follows:

<u>Age of Clone</u>	<u>Number grown</u>	<u>Approximate No. saved</u>
1st year seedling	18,000	600+
2nd year selections	672	199
3rd year selections	106	58
4th year and older selections	88	68

Variety Trials

During 1959, six replicated variety trials were grown at Grand Forks, Park River, Fargo, Minot, and with and without irrigation at Williston. The varieties were grown in plots of 25 hills and replicated four times in a randomized block. Moisture was ample for good potato production at Grand Forks and Fargo, while at Park River, Minot, and Williston, moisture conditions were somewhat below normal. This was particularly true at Williston where less than 8 inches of rainfall fell during the growing season. Insecticides and fungicides were applied as a spray or dust for the control of late blight and insects.

Trials at the North Dakota Experiment Stations located at Fargo, Minot, and Williston were conducted by the respective research personnel in charge. At Park River and Grand Forks, Mr. Robert Amstrup and Mr. Harry Earl, respectively, were in charge of the general maintenance of the trials. Tubers from all plots were harvested and weighed as to total and US No. 1 yield. Specific gravity determinations were made by the use of a potato hydrometer.

Fertilizer applied, soil type, planting, and harvest date of each location follows:

<u>Location</u>	<u>Fertilizer applied</u>	<u>Soil type</u>	<u>Planting Date</u>	<u>Harvest Date</u>
Fargo	300#/A 16-16-8	Fargo Clay	May 20	Oct. 3
Grand Forks	300#/A 16-16-8	Bearden Clay Loam	May 12	Sept. 14
Park River	350#/A 16-16-8	Glyndon Silt Loam	May 8	Sept. 10
Minot	None	Loam	May 15	Oct. 2
Williston Irrigation	Sidedressed 100#/A 33-0-0	Arnegard Silty Loam	May 9	Sept. 19
Williston without Irrigation	None	Williams Loam	May 12	Sept. 21

Twelve varieties or selections were grown at all locations, while additional varieties or selections, numbering 14 at Park River, 18 at Grand Forks, and 11 at Fargo, were grown in trial.

Red Pontiac produced the highest average marketable yield of all varieties grown in the State-wide trial (ND. table 2). Other varieties with comparatively high yields were Kennebec, Cobbler, and Red LaSoda, while fair to good yields were recorded for the selection ND 3740-11 and Norland. Fundy and ND 3022-18 produced

good yields and good type tubers when grown in trials at Park River and Grand Forks. The selections ND 3815-1R and ND 4192-3 produced good yields when grown at the three locations in the Red River Valley. Very low yields were recorded for the selections ND 3631-6R and C.S. 11889. The percent US No. 1 tubers of potato varieties and selections grown in 1959 are recorded in North Dakota (ND table No. 4).

With ample moisture at Park River, Grand Forks, and Fargo, Red River Valley yields averaged well over 200 cwt. per acre; however, at Williston and Minot (western trials) where moisture was below normal, very low yields were recorded. Droughted conditions at Williston were quite evident when the irrigated trial yielded an average of 370 bushels more per acre than the dryland trial. Total solids or specific gravity in 1959 was slightly below that of 1958, but still above normal. The average total solids of all locations was 20.6 percent, (N.Dak. table 3). Total solids of the western trials were slightly higher than total solids recorded in the Red River Valley. This again may be attributed to extreme drought conditions in western North Dakota, as high moisture conditions will tend to reduce the percent total solids. Further evidence of this was noted in the Williston irrigation trial, where the non-irrigated trial averaged 22.2 percent total solids and the irrigated trial 20.8 percent total solids. Cobbler, ND 4122-2, and Navajo produced the highest total solids, followed closely by ND 3324-2, Norgleam, and Nordak. Other selections with good average percent total solids were ND 3676-21, CS 11889, ND 3676-20, ND 4192-3, ND 3022-18, and Fundy.

Earliest maturing selections or varieties in trials were Nordak, Norgleam, Norland, ND 3324-2, Fundy, and CS 11889. Kennebec was the latest maturing. Good to moderate scab resistance was noted for Norland, and the selections ND 4121-25, ND 4122-2, F 29-1, and 4192-3.

In 1959, 23 selections or varieties were grown in the Red trial at Grand Forks (N. Dak. table 1). ND 4468-1R with a marketable yield of 412 bushels per acre produced the highest yield of all entries in this trial. Outstanding horticultural characteristics of this selection (ND 4468-1R) are its resistance to scab and late blight, good color, and type. Other high-yielding selections or varieties in the Red trial were Picha 5, ND 3631-5R, Red Warba, and Picha 15. The high yield recorded for the variety Red Warba may be contributed to planting of virus X free seed of that variety. ND 3631-6R produced very low yields. Red Warba, Picha 5, ND 3978-6R, and 4419-2R produced the highest percent total solids. All varieties and selections in the Red trial produced an average of approximately 20.0 percent total solids.

Chipping Tests

During 1958-1959, 21 advanced selections or varieties grown at Park River, and 18 advanced selections or varieties grown at Grand Forks were tested for chipping quality. All samples were stored at 40° F. from November 10 until January 20, and then reconditioned at a temperature of 65-70° F. until the final chip test, which was made on February 18. All samples were chipped on November 8 prior to being stored at 40° F. and at 5 weekly intervals beginning on January 21.

All samples from 2 replications grown at Park River and Grand Forks were tested by frying a 100-gram sample of sliced potato in peanut oil at 345° F. Both samples were weighed before and after frying. Chipping quality was determined by the use of an arbitrary visual scale of 1-6 (1 dark, 6 light) for chip color, and chip yield was calculated as percent recoverable of peeled-raw-sliced-potato weight.

Little or no differences in average chip color were noted between the two locations, Park River and Grand Forks (N. Dak. table 5), but, in some instances, varietal differences were noted. For example, at Park River both Nordak and ND 3324-2 made a chip lighter in color than the same variety and selection grown at Grand Forks. Most varieties or selections produced a light-colored chip before being placed in cold storage, and a dark-colored chip immediately after being removed from cold storage. The varieties Kennebec and Cobbler and the selections ND 3676-21, ND 3694-6, ND 3324-2, and ND 4122-2 produced light-colored chips after a reconditioning period of 3-4 weeks, which indicated that those varieties or selections have reconditioning ability. Cobbler and ND 3676-21 gave the highest chip yield (N. Dak. table 5).

Other tests included chipping a sample from several selections grown in the red trial at Grand Forks (N. Dak. table 6) and chipping a sample of 7 selections or varieties grown in irrigated and non-irrigated trials at Williston (N. Dak. table 7). Chipping procedure for these trials was the same as that conducted on varieties and selections grown in state-wide trials at Grand Forks and Park River.

In the red trial at Grand Forks, only the variety Redbake made an acceptable chip. Other red selections and varieties produced chips that were very dark in color. When comparing chip quality of non-irrigated vs. irrigated potatoes at Williston, the non-irrigated trial produced the lightest colored chips, however, chip yields were comparable. It was also found in this chipping experiment that Cobbler, Kennebec, and ND 3324-2 produced chips of very acceptable quality.

Testing for Disease Resistance

One hundred and ninety-four advanced selections were tested for resistance to scab and silver scurf Spondylocladum atrovirens (Harz.) at Northwood, Park River, and Fargo. In addition, several varieties and selections from the United States Department of Agriculture and Minnesota were tested for scab and silver scurf resistance at Northwood and Fargo. Prevalent scab types varied between locations. At Fargo, pitted and some superficial types were present, while at Northwood and Park River, only the russet or superficial type was present. Silver scurf readings were recorded at all locations. Several varieties and selections expressed similar or more resistance to scab and silver scurf than the check varieties: Cherokee, Red Pontiac, Cobbler, and Early Gem.

During March, 1959, 300 advanced selections were screened for resistance to race "0" of late blight. The detached leaf method was used, placing an inoculated leaf in a moist chamber and recording symptoms in approximately 7 days. Selections were recorded as being highly resistant, moderately resistant, low resistant, and susceptible, depending on lesion size and sporulation. Several selections expressed high resistance to race "0" of late blight. Approximately 200 selections were tested for immunity to virus X. Several selections expressed immunity to virus X, but further testing is necessary in order to establish their true immunity or susceptibility. Thirteen selections with resistance to late blight combined with X immunity were saved for replanting (N. Dak. table 8).

Sixty-five advanced clones, 153 second-year clones, and 45 families derived from ND selection 457-1 and its S_1 and S_2 lines were grown to test their resistance to virus Y. Only five of the 65 advanced selections developed symptoms to virus Y. Selection 457-1 and the S_1 and S_2 clones did not exhibit Y symptoms. No primary infection was evident in the second-year clones.

Late current season Y readings were not made in the field because of adverse environmental conditions. Tuber samples from all individual hills were harvested for indexing in the greenhouse. This will aid in the detection of the diseased hills. Greenhouse indexing will serve another purpose. Other viruses will be observed and the infected material eliminated from the test. Consequently, all material planted in the field should be quite free of viruses.

In breeding for resistance to virus Y, the effect of inbreeding on the loss of vigor was studied. Stainable pollen percentage and plant vigor of the various vines were obtained. The percent of stainable pollen decreased from 64 percent (ND 457-1) to an average of 7.7 in the S_2 . The mean of the S_1 lines was intermediate. Pollen viability could be retained by outcrossing. Pollen stainability could be restored to that of the S_1 by crossing the S_2 by ND 457-1 or by a ND 457-1 hybrid. The possibility of obtaining high pollen, fertile individuals from a highly inbred family is good.

In the S_2 by 457-1 cross, the range is from 52 to 55 percent stainable; while in the S_2 by 457-1 hybrid cross, the range is zero to 86 percent. Selection of the individual plants high in pollen count may be an aid in the selection for further inbreeding. Plant vigor data suggest no differences between the crosses and selfs under observation. The use of high type of virus Y resistance as present in Solanum stoloniferum has been incorporated into the program. Successful crosses have been made. Inbreeding and backcrossing will be done for expression of virus Y resistance.

Selfed materials were observed for haploid individuals. Seven plants were observed as having characters descriptive of haploids. These will be tested cytologically.

North Dakota table 1. Red-skinned potato variety trial. Marketable yield in bushels and cwt. per acre, percent U. S. No. 1, and total solids of selections and varieties grown at Grand Forks, North Dakota, 1959.

Variety	U. S.	Total	Marketable	
	No.1	solids	yield	
	Pct.	Pct.	Bu.	Cwt.
ND 4468	95	20.1	412	248
Picha 5	86	21.0	395	237
ND 3631-5R	95	18.4	393	236
Red Warba	93	21.3	378	227
Picha 15	89	20.1	372	223
Excel	91	21.2	365	219
ND 3978-6R	96	21.0	345	207
ND 3815-1R	98	19.9	337	203
ND 4289-5R	96	20.8	337	203
ND 4289-14R	99	20.1	333	200
Red LaSoda	97	18.6	330	198
Red Pontiac	94	18.2	318	191
ND 3950-4R	88	19.5	317	190
ND 4173-3R	95	17.9	312	187
ND 4359-5R	95	18.9	310	186
ND 3699-5R	94	20.3	309	186
ND 4173-1R	95	20.8	300	180
Norland	93	18.4	292	175
ND 4289-15R	93	21.2	287	172
Long 2.23	98	20.1	242	145
ND 4419-2R	89	21.0	238	143
ND 4283-8R	97	19.7	182	109
ND 3631-6R	83	18.4	125	75
Average	93	19.9	314	189
L.S.D. 5%		.16	19	11
L.S.D. 1%		.21	25	15

North Dakota Table 2. Marketable yield in cwt. per acre of varieties and selections grown in State-wide potato variety trials, 1959.

Variety	Williston						Average yield
	Fargo	Grand Forks	Park River	Minot	Dryland	Irrigation	
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Red Pontiac	172	197	181	89	60	353	175 ^{1/}
Kennebec	181	193	184	84	66	307	169
Cobbler	196	184	162	80	57	323	167
Red LaSoda	179	152	183	76	54	343	165
ND 3740-11	209	201	163	76	49	255	159
Norland	168	189	146	76	42	308	155
Norgleam	234	173	163	76	56	183	148
ND 3324-2	143	180	166	80	32	277	146
Nordak	180	186	147	51	57	243	144
ND 3631-5R	165	162	154	58	37	276	142
ND 4122-2	194	164	155	73	46	208	140
Navajo	109	101	79	42	27	214	95
ND 3815-1R	178	172	209				186 ^{2/}
ND 4192-3	188	147	133				156
F 29-1	125	157	109				130
ND 3740-1	111	139	96				115
ND 3676-21	131	107	106				114
ND 3676-20	130	137	74				114
ND 4121-25	118	151	63				111
CS 11889	93	67	68				76
ND 3022-18		182	171				177 ^{3/}
Early Gem	159	149					154
Fundy		148	152				150
ND 3919-2		150	145				148
ND 3676-33		109	137				123
ND 3694-6		112	120				116
ND 3631-6R	56		54				55
ND 3440-2		178					178
ND 3676-5		150					150
ND 3740-9		103					103
Average	155	153	135	72	49	274	139
L.S.D. 5%	12	97	10	8	25	103	
L.S.D. 1%	17	129	13	10	33	138	

^{1/} Average 6 locations

^{2/} Average 3 locations

^{3/} Average 2 locations

North Dakota table 3.--Total solids of potatoes grown in state-wide variety trials, 1959.

Variety	Fargo	Grand Forks	Park River	Minot	Williston		Average yield
					Dryland	Irrigation	
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Cobbler	21.6	21.9	21.2	23.4	23.4	22.3	22.3 ^{1/}
ND 4122-2	20.6	21.0	22.7	23.0	23.8	21.9	22.1
Navajo	22.0	20.6	22.2	23.0	23.0	21.6	22.1
ND 3324-2	18.9	21.9	22.2	22.4	21.9	21.2	21.4
Norgleam	19.7	21.4	21.0	23.4	22.3	20.6	21.4
Nordak	19.5	21.6	21.0	22.7	22.2	21.4	21.4
Kennebec	19.3	19.7	19.9	21.2	23.2	21.0	20.7
Red LaSoda	18.9	18.6	19.9	21.4	22.4	20.8	20.3
ND 3631-5R	19.7	18.9	19.9	21.2	21.6	20.6	20.3
ND 3740-11	19.1	19.9	19.9	20.8	21.4	19.3	20.1
Norland	17.8	19.1	18.4	20.3	19.5	19.7	19.1
Red Pontiac	18.4	17.8	18.6	19.9	20.6	19.1	19.1
ND 3676-21	20.1	22.7	22.2				21.7 ^{2/}
CS 11889	19.9	21.9	21.2				21.0
ND 3676-20	19.9	22.3	20.3				20.8
ND 4192-3	19.9	20.6	20.8				20.4
ND 3815-1R	18.6	19.9	20.6				19.7
ND 4121-25	18.9	19.5	19.5				19.3
ND 3740-1	18.4	19.7	19.5				19.2
F29-1	17.6	18.9	18.2				18.2
ND 3022-18		23.2	22.4				23.8 ^{3/}
Fundy		23.2	22.3				22.8
ND 3694-6		21.6	22.3				22.0
ND 3919-2		21.4	19.7				20.6
ND 3676-33		19.7	19.8				19.8
ND 3631-6R	18.9		19.1				19.0
Early Gem	17.9	18.6					18.3
ND 3676-5		23.1					23.1
ND 3440-2		20.8					20.8
ND 3740-9		19.3					19.3
Average	19.3	20.6	20.6	21.9	22.2	20.8	20.6
L.S.D. 5%	.72	.59	.64	.49	.57	.32	
L.S.D. 1%	.97	.78	.85	.69	.81	.45	

^{1/}Average 6 locations.

^{2/}Average 3 locations.

^{3/}Average 2 locations.

North Dakota table 4.--Percentage U. S. No. 1 of potato varieties and selections grown in state-wide potato variety trials, 1959.

Variety	Fargo	Grand Forks	Park River	Minot	Williston		Average yield
					Dryland	Irrigation	
Cobbler	89	92	83	86	66	96	85
Kennebec	84	97	88	86	67	97	87
Navajo	76	85	60	77	43	95	73
Nordak	90	96	86	83	76	94	88
Norgleam	92	94	91	90	67	93	88
Norland	84	95	74	76	53	97	80
Red Pontiac	86	94	79	80	54	96	82
Red LaSoda	90	96	87	78	66	99	86
Early Gem	82	87					85
Fundy		91	88				90
CS 11889	87	82	56				75
F 29-1	78	94	79				84
3022-18		97	85				91
3324-2	82	93	81	87	42	95	80
3631-5R	82	89	76	62	38	96	74
3631-6R	68		57				63
3676-20	76	84	51				70
3676-21	81	85	65				77
3676-33		85	81				83
3694-6		80	70				75
3740-1	60	81	59				67
3740-11	82	91	88	77	56	96	82
3815-1R	92	95	94				94
3919-2		95	75				85
4121-25	90	95	79				88
4122-2	85	87	77	86	52	95	80
4192-3	80	89	70				80
3440-2		91					91
3676-5		92					92
3740-9		72					72
Average	83	90	76	81	57	96	82

North Dakota table 5.--Chipping quality of varieties and selections grown at Grand Forks and Park River.^{1/}

Variety or selection	Color ^{2/} Nov. 8		Color Jan. 21		Color Jan. 28		Color Feb. 4		Color Feb. 11		Color Feb. 18		Color Average		Yield ^{3/} Average	
	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.
Cobbler	5.9	5.6	1.7	2.0	1.7	2.0	3.5	3.3	3.5	2.7	4.7	4.5	3.5	3.9	35.1	34.8
Kennebec	5.8	5.8	1.2	1.8	2.7	2.5	4.7	3.0	5.6	3.2	5.4	3.6	4.3	3.3	32.9	34.9
Nordak	5.9	5.1	2.5	1.5	1.7	2.2	2.7	1.2	2.7	1.9	4.0	3.7	3.3	2.6	32.6	32.9
Norglean	5.7	5.1	2.0	1.3	1.6	1.7	2.5	3.0	1.7	2.5	4.0	2.6	3.0	2.7	32.0	32.5
Norland	5.9	5.1	1.0	1.0	1.0	1.2	1.6	1.1	2.5	2.2	3.0	2.5	2.5	2.2	31.3	30.8
CS 13178	6.0	1.0	1.0	1.5	1.5	1.0	2.5	2.5	2.5		2.1	2.6	2.6		31.7	
CS 12240	5.8	1.0	1.0	1.2	1.2	1.0	1.3	2.5	1.0	1.0	3.6	2.6	2.6		31.9	
F 29-1	4.5	3.0	1.0	1.0	1.0	1.7	1.0	1.5	1.2	1.2	1.2	1.3	1.7	1.4	31.2	31.3
3152-1	5.6	3.8	2.0	1.0	1.2	1.0	1.1	1.7	1.5	1.2	3.9	2.6	2.6	2.0	30.8	32.7
3307-2	5.9	5.5	1.0	1.0	1.0	1.0	2.9	1.6	1.9	2.4	2.2	2.6	2.5	2.4	31.4	31.9
3324-2	5.9	5.7	2.2	1.0	3.0	1.5	3.6	2.2	2.1	2.1	5.0	2.5	3.6	2.5	33.5	33.4
3569-1 Russ	4.2	2.7	1.2	1.1	1.0	1.5	1.6	1.0	1.9	1.1	1.9	2.1	2.0	1.6	31.3	32.4
3631-6R	5.7	1.0	1.0	2.2	2.2	2.0	2.0	3.7	3.0	2.4	2.4	2.9	2.9		32.1	
3676-21 Russ	5.9	6.0	2.6	4.0	3.0	3.2	3.2	3.8	3.0	6.1	4.8	4.1	4.1	4.2	34.9	36.8
3694-6	6.0	6.0	2.7	2.5	3.5	3.2	4.9	5.3	5.0	4.1	5.2	4.4	4.4	4.3	33.9	34.4
3699-5R	5.8	5.8	1.5	2.5	2.0	1.9	2.7	2.7	2.0	2.1	2.7	2.7	2.7		31.6	
3740-11 Russ	5.4	4.3	1.0	1.0	1.0	1.0	1.6	2.5	2.5	2.0	2.5	2.3	2.2		31.2	32.7
3815-1R	3.8	1.2	1.2	1.0	1.0	1.3	1.2	1.2			1.2	1.6	1.6		31.5	
3959-2R	5.1	1.4	2.5	1.2	1.9	1.0	3.2	1.2	2.0	1.3	3.0	1.9	1.9		30.9	
4066-4	5.1	2.5	4.7	5.5	5.5	4.3	2.2	2.0	5.2	2.9	4.6	3.2	3.0	3.0	32.9	32.9
4066-6	5.9	5.9	1.8	2.7	2.7	2.0	3.5	2.2	2.0	2.0	3.2	3.2	3.2	3.3	33.5	33.5
4122-2	6.0	5.8	2.4	1.2	2.5	1.2	1.7	2.1	1.5	1.5	3.2	2.6	3.1	2.4	33.2	34.3
4121-25	6.0	5.7	2.4	2.3	2.5	2.5	2.1	3.5	2.7	2.8	3.9	3.9	3.4		33.2	32.7
3562-5 Russ	5.0	5.0	1.6	1.9	1.8	2.1	2.4	2.5	2.6	2.4	3.2	3.3	2.9	2.9	32.2	33.2
Average	5.6	5.1	1.6	1.9	1.8	2.1	2.4	2.5	2.6	2.4	3.2	3.3	2.9	2.9	32.2	33.2

1/ Samples were grown in 1958 and chipped during 1958-59.
 2/ Color rating 1-6 (1 poor-dark, 6 good, very light brown).
 3/ Percent chip yield.

North Dakota table 6.--Chipping quality of red-skinned varieties and selections grown in trial at Grand Forks^{1/}

Variety or selection	Nov. 10		Jan. 21		Jan. 28		Feb. 4		Feb. 11		Feb. 18		Average	
	Color ^{2/}	Yield ^{3/}	Color	Yield	Color	Yield	Color	Yield	Color	Yield	Color	Yield	Color	Yield
Picha 40	5.1	32.0	1.0	29.9	1.2	30.5	1.5	30.6	3.0	32.1	3.1	31.6	2.5	31.1
Redbake	4.8	33.5	2.0	31.4	2.2	31.4	3.0	30.8	4.3	33.3	3.2	33.5	3.3	32.3
Excell	4.4	30.8	1.0	31.7	1.5	31.9	1.0	33.6	2.3	32.2	2.4	32.5	2.1	32.1
Norland	5.7	30.4	1.1	30.4	1.0	29.2	1.0	28.6	2.1	30.4	1.8	29.7	2.1	29.8
3631-5R	4.5	31.6	1.0	29.7	1.0	31.6	1.1	31.5	2.1	30.7	1.9	31.2	1.9	31.1
3631-6R	5.1	31.6	1.0	30.6	1.5	31.5	2.8	31.6	1.9	32.5	2.0	31.7	2.4	31.6
3699-5R	3.4	32.4	1.0	31.5	1.7	31.9	1.8	31.2	2.0	31.1	2.1	32.1	2.0	31.7
3815-1R	2.5	29.8	1.0	29.5	1.5	32.0	1.0	30.3	1.9	33.1	1.6	32.5	1.6	31.2
3959-2R	4.7	32.2	1.0	28.2	1.0	29.4	1.0	30.5	1.0	31.0	2.6	35.9	1.9	31.2
3978-6R	3.7	34.1	1.2	30.5	1.0	31.0	1.2	29.9	2.0	31.1			2.0	31.3
Average	4.4	31.9	1.1	30.4	1.4	31.1	1.6	30.9	2.3	31.8	2.3	32.3	2.2	31.4

^{1/} Samples were grown in 1958 and chipped during 1958-59.

^{2/} Color rating 1-6 (1 poor-dark, 6 good, very light brown.)

^{3/} Percent chip yield.

North Dakota table 7.--Chipping quality of potatoes grown at Williston, North Dakota, under irrigation and non-irrigation, 1958-59.

Variety or selection	Color ^{1/}		Color		Color		Color		Color		Yield ^{2/}	
	Mar. 20	Mar. 27	Mar. 27	April 4	April 4	April 10	April 10	Average	Average	Average	Average	Average
	I ^{3/}	NI ^{4/}	I	NI	I	NI	I	NI	I	NI	I	NI
Cobbler	3.7	4.5	4.5	5.2	4.2	5.1	5.1	5.8	4.4	5.1	34.1	33.9
Kennebec	5.3	5.8	5.0	6.0	6.0	5.5	6.0	6.0	5.6	5.8	34.9	34.2
Norland	1.5	4.0	1.9	4.8	2.3	5.0	3.0	4.8	2.3	4.6	31.9	32.5
Norgleam	1.0	2.6	2.0	3.2	2.3	2.9	3.0	3.4	2.1	3.0	34.1	32.5
Nordak	1.0	1.9	3.0	2.7	3.2	3.2	3.2	2.9	2.6	2.7	32.8	32.4
ND 3324-2	1.3	4.6	2.9	5.5	3.4	5.0	5.5	6.0	3.3	5.3	33.0	33.2
Huron	1.1	2.3	2.6	3.3	1.3	2.9	1.8	2.9	1.7	2.9	34.7	35.8
Average	2.1	3.7	3.1	4.4	3.2	4.2	3.9	4.5	3.1	4.5	33.6	33.5

^{1/} Color rating 1-6 (1 poor-dark, 6 good, very light brown).

^{2/} Percent based on 100 pounds of potatoes.

^{3/} I = Irrigation.

^{4/} NI = Non-irrigation.

North Dakota table 8.--Reaction of several selections to virus X and race "0" of late blight.

Pedigree	Parentage	Reaction to		Disposition ^{3/}
		LB ^{1/}	X ^{2/}	
3919-2	Early Gem x B 1396N ₂	R	I	R
3919-10	"	R	I	R
3962-8R	2569-4R x B 2876-1	R	I	R
3967-1R	2780-6R x B 2876-1	R	I	R
4650-7R	Redkote x 3967-11	R	I	R
4706-1R	WX 125.52 x La 1859	R	I	R
4706-2	WX 125.52 x La 1859	R	I	R
4723-6	WX 137.52 x 3324-2	R	I	R
4730-1R	WX 141.52 x Norland	R	I	R
4913-2R	ND 3977-1R x 2853-3R	R	I	R
4932-5	Nordak x WX 141.52	R	I	R
4941-4	457-1-10-3 x WX 141.52	R	I	R
4936-3	Norgleam x WX 137.52	R	I	R

^{1/} R = Resistance to late blight.

S = Susceptible to late blight.

^{2/} I = Immune to virus X

S = Susceptible to virus X.

^{3/} D = Discard.

R = Retain.

OHIO (COLUMBIANA COUNTY)

Floyd Lower

The purpose of the test is to find new varieties suitable for chipping and also for table stock which would be adapted to this area.

Seed from experiment stations and certified seed were used. The cut seed was treated with dry captan before planting. The test was planted on Wooster silt loam on which alfalfa-timothy sod had been plowed down. Fertilizer (5-20-10) was applied in the row at the rate of 1200 pounds per acre. With the exception of four lots the seed was planted on May 6. All of the potatoes were dug on September 26 having been killed by September frost. They were weighed in the field without grading. The season was generally favorable with rather dry conditions in late August and September. No diseases of importance were present and late blight did not develop this year.

Yields, Sources and Comments. Twenty-two lots were planted in 1/100 acre plots and 38 five-pound lots were planted for observation. However, these were also weighed. The 1959 yields were not as high as in some years. The 1/100 acre plots averaged 310 bushels per acre and the 5-pound plots averaged 270 bushels per acre. There was an extreme variation in the yields of the various lots. Yields are computed on the basis of total production of field run potatoes and are not on a marketable basis. Comments in the complete report cover the differences in size, quality, grade, etc.

All lots had uniformly good stands except Plymouth. Consequently, the results for this lot are not truly characteristic of the variety.

Plymouth, Katahdin and Merrimack were checked on three other farms in the county, with Plymouth averaging 406 bushels per acre, Katahdin 392, and Merrimack 298.

Saco was probably the highest yielding of all varieties year after year but it is so rough that it is not suitable for table stock. It might be grown for chips only. Red Pontiac leads the list and is usually near the top. Kennebec usually yields well in this area. Some of the other well-known varieties were not grown since the purpose was to find new varieties suitable for the area.

Final choice of varieties to be grown again in 1960 and those to be discarded must be made after final chipping tests have been completed. Dr. Wilbur Gould at Ohio State University and Berg Bretzels, Inc., at Leetonia, are running chipping tests. The tables give the chipping tests so far reported for those varieties being checked by Ohio State University.

Of the varieties of cobbler season or earlier that have been tried, none can yet be recommended as being better than Cobbler. Some offer promise but must be given further trial. Of the white mid-season and late mid-season varieties, Katahdin and Kennebec are undoubtedly still the best yielders in this area. Of the red varieties of this maturity, Red Pontiac leads. Red LaSoda and Redkote are also possible red varieties. Some of the other red and white varieties look very promising but must be tried further.

Disease resistance is being given much consideration in breeding. Of the 56 varieties in the 1959 plots, 29 are scab resistant, 15 are late blight resistant, 17 are resistant to one or more viruses and 5 are resistant to one or more other diseases.

Lower table 1. Potato variety test, Columbiana County, Ohio, 1959, (1/100 acre lots).

Variety	Total yield per acre	Maturity rating *	Specific gravity	
			September After Harvest	December 23-24
	Bu.			
Red Pontiac	490	LM		
Red LaSoda	423	ME		
Kennebec	387	LM	1.080	1.080
Kennebec	362	LM	1.083	1.076
Saco	347	L	1.084	1.079
Iowa 961-1	335	ME	1.073	1.066
Cobbler	308	E	1.077	1.074
Rukat	306	M	1.070	1.065
LaSalle	303	M	1.075	1.072
Manota	302	E	1.072	1.069
Wisc. 1429	301	E	1.071	1.067
Delus	298	M	1.085	1.078
Iowa 801-10	295	EM	1.082	1.079
Norland	290	VE	1.049	1.055
Rushmore	287	E	1.068	1.063
Red Beauty	286	ME		
Redkote	279	E		
Katahdin	265	M	1.062	1.057
Plymouth	264	M	1.073	1.067
Merrimack	240	L	1.083	1.080
Katahdin	226	M		
Tawa	225	EM	1.065	1.066

* Maturity Rating: LM, late mid-season; ME, Medium early; L, late; E, early; M, mid-season; VE, very early; EM, early mid-season.

Lower table 2. Potato variety test, Columbiana County, Ohio, 1959, (5 lb. lots).

Variety	Total yield per acre	Maturity rating *	Specific gravity	
			September After harvest	December 23-24
	Bu.			
Onaway	466	E		
45.51-3	440	M		
Wisc. Ag. 59	404	VE		
N.D. 3324-2	398	E		
Wisc. Ag. 29	393	VE		
Wisc. X 143-52	387	EM		
Wisc. X 137-52	378	VE	1.079	1.079
P 13	372	M		

continued

Lower table 2, continued.

Mohawk	361	LM	1.079	1.078
Marygold	359	ME		
Ag. 56.55	355	L		
ND 3631-6R	353	E	1.065	1.059
B 605-10	350	E	1.073	1.067
Norgleam	336	E	1.066	1.068
ND 3740-11	336	M		
Nordak	318	VE		
Excel	316	EM		
P 5	314	VE		
CS 11,889	310	VE		
Dazoc	299	E		
Knik	299	L		
Redglo	297	M		
Antigo	286	ME	1.075	1.066
Redbake	280	EM	1.072	1.068
315.48-3X	278	EM		
Navajo (CS 13,178)	278	LM	1.0737	1.070
Tawa	271	EM		
P 6	269	E		
Wisc. Ag. 120	267	E		
Haig	265	E		
ND 4121-25	254	VE		
Canso	252	M	1.083	1.077
Mich. 1111-8	252	M		
Blanca (CS 122,240)	226	LM	1.067	1.065
ND 4122-2	222	EM		
ND 2274-3R	190	VE		
Plymouth	186	E		
Mich. 1111-5	184	EM		

* Maturity Rating: LM, late mid-season; ME, medium early; L, late; E, early; M, mid-season; VE, very early; EM, early mid-season.

OHIO
J. P. Slesman

Potato leafhopper populations in 1959 were unusually high and unsprayed susceptible varieties were severely damaged by hopperburn. Potato flea beetle populations were below normal. Late blight was not observed in any of the experimental plantings.

Materials studied for resistance to insects included 35 advanced selections, 800 first-year seedlings representing 7 progenies that were provided by Mr. Akeley, and about 200 species accessions that were received from Dr. Hougas. Leafhopper populations were determined by counting the nymphs on 10 leaves selected at random from each plot. Comparative flea beetle damage estimates were made by counting the adult flea beetle feeding punctures in a sample of 10 leaves picked at random from each plot.

Resistance to insects has been found in certain strains of tuberosum, but thus far a strain has not been developed which combines resistance with desirable horticultural qualities. It will be seen in Ohio tables 1 and 2 that certain strains are resistant to the potato leafhopper and that the progenies of crosses between a resistant and a susceptible variety segregate for resistance to the leafhopper. This is true also for the progenies of crosses between a resistant species and a susceptible variety of tuberosum as shown in Ohio table 3. Resistance occurred about 10 percent of the time; in general, the larger the leafhopper population the greater the degree of hopperburn. Flea beetle populations were not correlated with leafhopper populations which is in agreement with data obtained in previous years.

Resistance to both the potato leafhopper and the potato flea beetle has been found among the Solanum species as will be seen in Ohio table 4. The insect resistant species should be of great value in the breeding program, and it will be interesting to study the progeny from species-tuberosum crosses.

Ohio table 1.--Leafhopper and flea beetle populations on selected seedlings, Wooster, Ohio, 1959.

Pedigree	Parentage	Leafhopper nymphs ^{1/}	Flea beetle holes ^{2/}	Hopper- burn ^{3/}
B4524-1	B 2331-5 x Wv 14-17	10.7	86	4
B4524-2	" "	13.4	59	4
B4524-3	" "	4.7	57	5
B4524-4	" "	16.4	50	2
B4524-5	" "	15.6	57	4
Cobbler	" "	25.2	66	5
B4524-6	B 2331-5 x Wv 14-17	9.9	77	5
B4524-7	" "	7.6	72	5
B4524-8	" "	9.7	95	5
B4524-9	" "	16.3	74	4
B4524-10	" "	11.3	25	5
Cobbler	" "	30.6	75	5

Continued

Ohio table 1 continued.

Pedigree	Parentage	Leafhopper nymphs ^{1/}	Flea beetle holes ^{2/}	Hopper- burn ^{3/}
B 4524-11	B 2331-5 x Wv 14-17	15.3	73	5
B 4524-12	" "	13.4	44	4
B 4524-13	" "	16.2	76	5
B 4524-14	" "	10.9	75	5
B 4524-15	" "	18.1	60	5
Cobbler		22.2	55	5
B 4524-16	B 2331-5 x Wv 14-17	5.9	65	4
B 4524-17	" "	8.5	71	2
B 4572-1	Sequoia x A 124-62	12.7	63	5
B 4572-2	" "	7.6	30	2
I 5744	I 1077 W 28-5 x B 3556-12	7.0	72	5
Cobbler		22.0	80	5
I 57199-1	B 2759-5 x I 1077 W 28-5	13.5	71	5
I 57199-2	" "	9.6	24	5
I 57199-3	" "	9.7	37	5
I 57199-4	" "	10.2	45	5
I 57199-5	" "	14.7	48	4
Cobbler		29.6	61	5
I 57150	B 24-58 x B 3428-41	13.0	58	5
B 4523-1	B 922-6 x B 3944-11	9.7	145	5
B 4523-2	" "	16.2	62	5
B 4523-3	" "	5.8	32	5
B 4523-4	" "	9.3	61	4
Cobbler		21.4	75	5
S 3022-1	X 927-3 x 4 N Chacoense	11.3	17	5
I 1411-1	I 1077 W 28-5 x I 902-2	6.2	54	5
OB 3957-2	Ac 25953 x Teton	1.0	19	2
AI 5561-4	Chacoense-tuberosum x Katahdin	0.0	34	1
Cobbler		32.0	70	5

^{1/} Number leafhopper nymphs per leaf.

^{2/} Number flea beetle holes per leaflet.

^{3/} Classes of hopperburn: 1, none; 2, trace; 3, light; 4, medium; 5, heavy.

Ohio table 2.--Leafhopper populations and degree of hopperburn in seedlings of various progenies, Wooster, Ohio, 1959.

Pedigree		Classes of hopperburn ^{1/}				
		1	2	3	4	5
B 4743	No. of seedlings/class	0	16	14	5	117
	No. of nymphs/leaf	-	1.9	2.8	2.2	2.8
B 4753	No. of seedlings/class	22	39	48	19	25
	No. of nymphs/leaf	0.5	1.2	1.4	1.4	1.8
B 4782	No. of seedlings/class	0	0	1	0	94
	No. of nymphs/leaf	-	-	0.8	-	2.0
B 4791	No. of seedlings/class	10	15	18	11	21
	No. of nymphs/leaf	0.3	1.8	3.7	3.8	2.3
B4882	No. of seedlings/class	1	16	21	14	31
	No. of nymphs/leaf	1.0	1.7	2.3	2.6	3.0

^{1/} Classes of hopperburn: 1, none; 2, trace; 3, light; 4, medium; 5, heavy.

Ohio table 3.--Leafhopper and flea beetle populations in species hybrids,
Wooster, Ohio, 1959

Seedling No.	BW 671 (BW 168-2 x Katahdin)				BW 670 (BW 165-2 x Katahdin)			
	Nymphs ^{1/}		Flea beetle holes ^{2/}	Hopper- burn ^{3/}	Nymphs ^{1/}		Flea beetle holes ^{2/}	Hopper- burn ^{3/}
	July 15	Aug. 26			July 15	Aug. 26		
1	.0	2.0	25	1	.2	1.2	27	2
2	.8	1.8	27	2	.0	1.6	29	1
3	3.4	5.0	23	4	.2	3.8	28	2
4	2.0	3.0	8	3	.0	2.6	21	3
5	2.4	4.0	9	3	.4	2.8	36	4
6	2.2	3.0	10	4	.2	.8	22	1
7	3.4	4.0	9	4	.0	1.4	18	2
8	1.8	3.0	61	3	.0	.8	41	2
9	2.0	2.2	23	2	.0	3.0	49	2
10	1.8	2.0	7	4	.0	2.4	66	3
11	1.4	2.4	9	3	.4	3.2	32	4
12	4.6	3.0	22	3	.6	1.0	23	1
13	1.8	6.0	21	3	.4	2.2	16	2
14	3.4	3.0	7	4	.4	2.2	36	2
15	1.8	4.0	5	4	.6	2.8	38	4
16	1.8	4.0	7	4	.2	.8	38	1
17	1.0	2.0	19	4	.0	1.6	75	2
18	4.6	5.0	6	4	.0	2.2	55	3
19	2.4	2.0	17	4	.4	1.4	27	2
20	.4	5.0	30	4	.2	3.0	19	3
21	1.0	.6	22	1	.6	1.6	29	3
22	.2	1.0	6	2	.4	1.6	51	2
23	4.4	3.0	10	4	.4	2.0	27	2
24	1.8	3.0	16	4	.4	1.8	36	2
25	3.4	3.0	19	3	.4	2.6	32	3
26	1.8	3.6	13	3	.2	2.0	25	2
27	1.0	4.0	22	2	.2	2.2	25	4
28	1.6	4.0	22	3	.6	3.8	13	4
29	1.0	3.2	5	2	.0	1.8	38	3
30	2.0	2.8	31	4	.2	1.2	38	2
31	2.6	4.0	17	4				
32	1.4	2.4	40	3				
33	1.6	1.4	33	1				
34	.2	3.0	47	3				
35	.2	.6	67	1				
36	.0	.6	14	1				
37	.0	1.4	45	1				
38	.8	1.5	21	1				
39	1.2	3.0	22	3				
40	3.0	2.4	20	3				
41	2.4	3.0	10	3				
Cobbler	28.2	-	90	5				

^{1/} Number leafhopper nymphs per leaf.

^{2/} Number flea beetle holes per leaflet.

^{3/} Classes of hopperburn: 1, none; 2, trace; 3, light; 4, medium; 5, heavy.

Ohio table 4.--Leafhopper and flea beetle populations in various Solanum species.
Wooster, Ohio, 1959.

Species	Leaf- hopper nymphs ^{1/}	Flea beetle holes ^{2/}	Hopper- burn ^{3/}	Species	Leaf- hopper nymphs ^{1/}	Flea beetle holes ^{2/}	Hopper- burn ^{3/}
<i>S. acaule</i>	0	10	4	<i>S. demissum</i>	0	1	3
"	0	13	4	"	0	0	5
"	0	8	4	"	0	7	4
"	0	1	4	<i>S. ehrenbergii</i>	0	3	5
"	1	3	5	<i>S. famatinae</i>	0	8	1
<i>S. acroscopicum</i>	2	15	4	<i>S. goniocalyx</i>	0	17	5
<i>S. ajanhuiri</i>	1	25	4	<i>S. gourlayi</i>	0	1	5
<i>S. berthaultii</i>	0	0	1	<i>S. guerreroense</i>	1	13	4
<i>S. brachycarpum</i>	0	9	1	<i>S. hougasii</i>	0	0	5
<i>S. brevicaulis</i>	4	3	5	"	0	0	5
<i>S. bulbocastanum</i>	1	0	1	<i>S. jamesii</i>	0	3	5
<i>S. canasense</i>	1	17	1	<i>S. kurtzianum</i>	0	5	5
<i>S. candolleanum</i>	0	22	5	<i>S. maglia</i>	1	0	2
<i>S. cardiophyllum</i>	1	5	1	<i>S. neohawkesii</i>	0	20	5
"	1	2	5	<i>S. phureja</i>	3	15	5
"	0	0	5	"	6	9	5
<i>S. chacoense</i>	0	0	1	"	2	15	5
"	0	0	1	"	10	6	5
"	0	10	1	"	3	5	5
"	0	13	4	"	5	2	5
"	0	0	3	"	8	5	5
"	0	0	1	"	2	4	5
"	0	0	1	"	1	5	5
<i>S. curtilobum</i>	3	20	5	"	4	3	5
<i>S. demissum</i>	0	7	3	"	8	3	5
"	0	2	4	"	4	2	5
"	0	6	4	"	8	2	5
"	0	10	3	"	3	2	5
"	0	6	3	"	4	12	5
"	0	1	3	"	2	3	5
"	0	6	5	"	7	8	5
"	0	2	3	"	4	5	5
"	0	1	3	"	3	6	5
<i>S. phureja</i>	6	4	5	<i>S. tuberosum</i>	2	4	5
"	4	3	5	"	4	4	3
"	2	6	5	"	1	2	3
<i>S. pinnatisectum</i>	1	0	2	"	2	4	3
"	0	0	2	"	2	5	3
"	3	0	2	"	6	4	3
"	2	0	2	"	4	4	4
"	1	0	5	"	2	1	5
<i>S. polyadenium</i>	0	0	1	"	3	1	5
<i>S. raphanifolium</i>	3	5	5	"	3	1	5
<i>S. sanctae-roseae</i>	2	0	5	"	4	1	5
<i>S. setulosistylum</i>	0	0	1	"	2	1	5
<i>S. simplicifolium</i>	0	0	1	"	3	2	5
"	1	0	3	"	0	1	5
<i>S. sogarandinum</i>	0	1	2	"	2	1	5

Continued

Ohio table 4 continued.

Species	Leaf-hopper nymphs ^{1/}	Flea beetle holes ^{2/}	Hopper-burn ^{3/}	Species	Leaf-hopper nymphs ^{1/}	Flea beetle holes ^{2/}	Hopper-burn ^{3/}
<i>S. soukupii</i>	0	1	2	<i>S. tuberosum</i>	3	1	5
<i>S. sparsipilum</i>	0	8	1	"	3	1	5
<i>S. stenotonum</i>	0	12	5	"	1	2	5
<i>S. stoloniferum</i>	5	5	2	"	1	1	5
"	1	4	5	"	1	6	5
"	1	0	2	"	1	2	5
"	6	0	3	"	1	1	5
"	1	0	2	"	2	2	5
"	5	0	3	"	2	2	5
"	1	0	5	<i>S. vernei</i>	4	2	5
"	1	0	3	<i>S. verrucosum</i>	1	3	5
"	0	0	2	"	4	1	5
"	1	0	2	Hybrid 188636	0	2	5
"	2	0	5	" 188644	10	5	3
<i>S. sucrense</i>	4	7	4	" 188646	1	1	4
<i>S. tarijense</i>	1	0	2	" 188662	1	1	3
<i>S. tuberosum</i>	3	5	3	" 188664	6	2	2
"	4	8	2	" 188668	0	1	3
Hybrid 201401	3	3	5	Hybrid 208350	2	2	3
" 201402	7	3	5	" 210062	5	3	5
" 201403	3	3	5	" 210063	2	1	4
" 201405	10	2	5	" 214372	2	3	5
" 201406	2	1	5	" 214373	1	2	3
" 201407	3	2	5	" 214374	1	6	3
" 201408	1	2	5	" 215617	5	1	3
" 203899	9	8	5	" 215618	6	1	3
" 203900	1	5	5	" 215619	2	1	5
" 203904	5	2	5	" 215620	1	10	5
" 203905	1	4	4	" 217391	2	4	4
" 203906	2	2	4	" 222943	1	2	4
" 208324	4	1	5	" 222945	1	0	5
" 208325	1	1	2	" 222947	4	4	4
" 208326	2	1	5	" 222948	2	1	4
" 208328	4	4	5	" 222950	2	3	3
" 208329	7	3	4	" 222952	0	1	5
" 208330	9	2	5	" 227680	1	1	3
" 208331	8	5	4	" 230563.1	1	3	2
" 208332	5	3	5	" 230564.1	1	1	2
" 208336	4	2	3	" 230565.1	0	3	2
" 208340	7	2	3	" 230659	1	8	3
" 208343	8	3	5	" 230660	2	4	3
" 208344	5	2	3	" 230662	1	4	3
" 208349	0	1	3	Cobbler	26	65	5

^{1/} Number leafhopper nymphs per leaf.

^{2/} Number flea beetle holes per leaflet.

^{3/} Classes of hopperburn: 1, none; 2, trace; 3, light; 4, medium; 5, heavy.

PENNSYLVANIA
J. D. Harrington and E. C. Pifer

Experimental Conditions - Centre County

The 1959 potato variety trials were conducted at the Agronomy Research Farm near Centre Hall, Pa. on a Hublersburg silt loam soil derived from dolomitic limestone with a silty clay subsoil and good internal drainage. A liberally fertilized grass sod preceded the potato research tests in the crop rotation. Total rainfall recorded in the area of the experimental site approximated a normal year. However, rainfall distribution was simply inadequate.

A completely randomized design with five replications was employed for each of the three potato maturity groups. Seedpieces were hand planted 9 inches apart within the 30-foot plot row with a distance of 3 feet between each row. Following an initial application of 1700 pounds per acre of a 5-10-10 analysis fertilizer in the row, varieties were planted on April 22 and 23. On September 23 and 25 the early and medium maturing varieties respectively were dug. The late maturing varieties were harvested on October 6. Plot weights and grading percentages, based on an average of all replications, were recorded soon after digging, at which time peck sample lots from each replicate were saved for specific gravity determinations at a later date.

Experimental Conditions - Outlying Counties

Variety trials at the seven different ecological sites in the State were conducted in cooperation with leading potato growers in their respective areas.

All experiments were designed as a randomized block with four replications. Seedpieces of each variety were hand planted in row plots 30 feet in length with a 9-inch spacing within the row. Seedpieces of the Red Pontiac variety were planted in the 3-foot breaks between plots. A planting distance of 34 inches between rows was employed at all locations except at the Potter County site in which case, rows were 32 inches apart. Final plot yields were recorded at digging and graded immediately according to U. S. official grades. A composite sample of the four replications was saved for dry matter determinations.

Results

The results of the variety trials as reported at the Agronomy Research Farm in Centre County and outlying county trials are shown in Pa. tables 1 and 2 respectively.

Of the early varieties tested in Centre County in 1959, Early Gem and Nordak matured earlier than Irish Cobbler; whereas, Avon and F 4613, a nice shaped tuber, matured later. The latter varieties appeared to mature at about the same time as Chippewa.

At harvest, sprouting of dug tubers was particularly noticeable in the Huron, Pungo, Saco and B 2368-4 plots.

Pennsylvania table 1.--1959 potato variety trial yield results expressed as percent U.S. No. 1 and hundred-weight per acre, percent solids and total dry matter production per acre of three different maturity groups grown at the Agronomy Research Farm in Centre County, Pennsylvania.

Varieties	Yields per acre, U.S. No. 1			
			Solids	Solids
	Pct.	Cwt.	Pct.	Cwt.
Early Varieties:				
Cobbler (Me.) <u>1</u> /	89	203	20.8	42
Cobbler (N.Y.)	84	194	20.9	41
Cherokee (N.Y.)	87	176	19.9	35
F 4613 (Me.)	90	174	18.9	33
Norland (N.D.)	84	171	16.9	29
Cobbler, Pre-cut (Me.)	83	167	20.7	35
Chippewa (N.Y.)	85	166	17.8	30
Nordak (N.D.)	91	165	19.8	33
Norglean (N.D.)	90	164	19.1	31
Dazoc (Nebr.)	79	161	17.9	29
B 605-10 (Me.)	86	155	19.2	30
Bliss (Minn.)	79	154	17.5	27
Avon (N.S.)	88	147	19.6	29
Rushmore (Me.)	83	147	18.2	27
Early Gem (Me.)	81	136	17.5	24
L.S.D. 5%		18	0.8	
L.S.D. 1%		25	1.0	
Medium Varieties:				
Red Pontiac (Minn.)	89	222	15.4	34
Onaway (Me.)	91	199	18.5	37
Rukat (N.Y.)	85	182	16.8	31
Smooth Rural (N.Y.)	77	182	17.3	31
Kennebec (N.Y.)	86	181	18.8	34
Pungo (Me.)	88	173	18.6	32
X 1276-185 (Me.)	85	161	18.3	29
B 73-3 (Me.)	88	156	21.0	33
Katahdin, Pre-cut (Me.)	85	151	17.2	26
F 5025 (Me.)	75	149	19.9	30
Plymouth (Me.)	87	144	18.7	27
Merrimack (N.Y.)	80	142	17.1	24
Tawa (Me.)	81	142	20.4	29
Katahdin (Me.)	87	141	17.4	25
Kennebec (Me.)	84	140	18.0	25
Delus (N.Y.)	87	137	19.4	27
Plymouth (N.Y.)	88	136	19.0	26
Katahdin (N.Y.)	80	115	17.4	20
B 137-5 (Me.)	72	113	18.9	21
L.S.D. 5%		24	0.5	
L.S.D. 1%		32	0.7	
Late Varieties:				
Huron (N.Y.)	84	221	17.5	39
Ontario (Me.)	80	216	15.5	33
Saco (N.Y.)	85	205	17.6	36
Sebago (Me.)	86	205	15.5	32
Green Mountain (N.Y.)	89	203	18.4	37
B 2368-4 (Me.)	85	191	16.3	31

Continued.

Pennsylvania table 1 continued.

Varieties	Yields per acre, U.S. No. 1			
			Solids	Solids
	Pct.	Cwt.	Pct.	Cwt.
Late Varieties:(Contd.)				
C.U. 1335 (N.Y.)	82	185	17.7	33
Sebago (N.Y.)	84	181	15.5	28
Russet Sebago (Me.)	85	170	15.8	27
Russet Rural (N.Y.)	70	154	16.3	25
Russet Burbank (N.Y.)	69	119	18.3	22
L.S.D. 5%		30	0.6	
L.S.D. 1%		40	0.9	

1/ Seed Source.

Pennsylvania table 2.--U.S. No. 1 potato yields in hundred-weights per acre, percent dry matter and total dry matter production per acre of different maturing varieties in seven Pennsylvania counties for 1959.^{1/}

Varieties	Erie		Lehigh		Luzerne		Potter	
	Yield	Solids	Yield	Solids	Yield	Solids	Yield	Solids
	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.
Early Varieties:								
Avon	235 17.5	41	146 16.7	24	244 17.8	43	184 19.5	36
Cobbler	167 17.9	30	122 17.7	22	215 17.1	37	131 19.6	26
Medium Varieties:								
Pungo	235 17.6	41	172 15.5	27	320 19.1	61	242 20.4	49
Kennebec	202 18.6	38	178 14.8	26	318 17.4	55	202 18.5	37
Katahdin	241 16.8	40	194 15.2	29	260 17.2	45	224 17.5	39
Delus	218 19.9	43	171 17.8	30	269 19.2	52	218 21.1	46
Plymouth	170 18.5	31	191 16.8	32	216 17.2	37	199 19.1	38
Merrimack	184 18.7	34	138 17.5	24	222 18.4	41	182 20.7	38
Late Varieties:								
Huron	248 20.1	50	128 15.4	20	320 18.0	58	258 19.3	50
Sebago	193 18.2	35	154 13.5	21	256 16.4	42	226 17.4	39
Russet Sebago	197 17.1	34	176 14.3	25	281 15.5	44	179 18.3	33
Russet Rural	206 19.2	40	46 15.7	7	214 18.0	39	191 19.0	36
B2368-4	- -		212 14.7	31	- -		249 17.9	45
Varieties	Schuylkill		Somerset		York		AVERAGE	
	Yield	Solids	Yield	Solids	Yield	Solids	Yield	Solids
	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.	Cwt. Pct.
Early Varieties:								
Avon	243 15.8	38	206 18.0	37	181 16.3	30	205 17.4	36
Cobbler	240 15.2	36	223 16.9	38	202 17.0	34	185 17.3	32
Norgleam	202 15.6	32	- -		- -		- -	
Medium Varieties:								
Pungo	289 15.9	46	343 18.7	64	212 15.3	32	259 17.5	45
Kennebec	311 16.3	51	326 17.6	57	241 16.9	41	254 17.2	44
Katahdin	245 14.4	35	174 16.0	28	223 15.9	35	223 16.1	36
Delus	221 16.0	35	211 17.9	38	193 17.7	34	214 18.5	40
Plymouth	207 16.6	34	223 17.8	40	194 16.5	32	200 17.5	35
Merrimack	148 15.6	23	281 19.2	54	227 17.2	39	197 18.2	36

Continued

Pennsylvania table 2 continued.

Varieties	Schuylkill		Somerset			York			AVERAGE			
	Yield	Solids	Yield	Solids		Yield	Solids		Yield	Solids		
	Cwt.	Pct.	Cwt.	Cwt.	Pct.	Cwt.	Cwt.	Pct.	Cwt.	Cwt.	Pct.	Cwt.
Late Varieties:												
Huron	289	15.9	46	299	18.5	55	254	15.6	40	256	17.5	45
Sebago	314	14.4	45	278	17.6	49	279	16.0	45	242	16.2	39
Russet Sebago	192	13.8	26	339	17.8	60	264	16.3	43	233	16.1	38
Russet Rural	154	15.3	24	234	19.0	44	111	15.5	17	165	17.4	29

1/ Variety trials conducted by Extension Agronomist, E. C. Pifer, in cooperation with extension representatives of the Departments of Agricultural Economics, Entomology, Plant Pathology and with the resident Agronomy staff of the Agricultural Experiment Station.

RHODE ISLAND

James E. Sheehan

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Potato yield trials consisting of 28 varieties were conducted at the Rhode Island Agricultural Experiment Station at Kingston, in 1959. Seed stock of all varieties included in the test was obtained from USDA sources at Presque Isle, Maine. The potatoes followed alfalfa on Bridgehamptom silt loam.

Yields were calculated on the basis of 32-foot rows. Seedpieces were spaced 12 inches apart in the row with 36-inch spacing between rows. Each variety was replicated four times. Fertilizer consisted of 2,000 pounds per acre of an 8-12-12-2 grade applied in bands at planting.

All varieties were planted on April 21 and harvested October 13. All vines were allowed to die naturally, no chemical vine killer was applied. Yields are listed in two tables as eight varieties were grown in a separate location from the main trials.

The 1959 growing season was one of the longest experienced in many years. The first frost did not occur until after all varieties had matured naturally. The mean temperature for April through September was 2.1 degrees above normal. Rainfall for the same period was slightly above normal but distribution was quite erratic. Rainfall was subnormal in April and May, well above normal in June and July and well below normal throughout August and September.

Rhode Island tables 1 and 2 give yield and other data from the 28 varieties. The selection B 2368-4 was the highest yielder with 557 hundred weight per acre followed by Kennebec 500, Green Mountain 481, Saco 479, and Huron 467 hundred weight per acre respectively. B 2368-4 has been an exceptionally high yielder in the trials, but it is rather rough skinned and has deep eyes which quite possibly would adversely affect its marketability for table stock.

Green Mountain had the highest dry matter content 20.5 percent followed by Merrimack 19.7 percent and Huron, Russet Burbank and Irish Cobbler 19.3 percent each. Selection B 2894-24 and Pontiac were quite low in total solids. The average total solids content is lower than last year in spite of the longer growing season this year. The average number of days to maturity was 135 in 1958 and 148 in 1959.

Nine insecticidal sprays were applied throughout the season to control various insect pests. Flea beetle populations were moderate and satisfactorily controlled by one-half pound of Dieldrin in 100 to 150 gallons of water per acre. DDT 50W was used for control of the three-striped beetle and Malathion for control of aphids.

Thirteen fungicide sprays were applied for late blight control, two in June, four in July, five in August and two in September. Vines were sprayed in accordance with the blight forecasting system. Conditions were often ideal for late blight and it was observed in active stages several times, but fungicidal treatment apparently held it in check.

Rhode Island table 1. Yield and other data for 20 potato varieties grown at Kingston, Rhode Island, 1959.

Variety	Yield per acre		Total solids	Days to Maturity	Tuber size	Skin and shape
	U. S. No. 1					
	Cwt.	Pct.	Pct.			
Kennebec	500	99.0	18.8	155	Large	Smooth regular
Green Mountain	481	99.0	20.5	155	Large	Rough irregular
Saco	479	99.1	18.2	153	Large	Smooth irregular
Huron	467	97.1	19.3	153	Large	Smooth irregular
Chippewa	457	99.0	17.1	145	Large	Smooth regular
Ontario	443	97.5	18.6	158	Medium	Smooth regular
Menominee	436	99.3	18.4	151	Large	Rough regular
Pontiac	432	99.1	16.3	155	Large	Rough regular
Mohawk	425	99.4	19.0	153	Medium	Rough regular
Sebago	409	98.6	18.2	158	Large	Smooth regular
Russet Rural	400	99.1	19.3	151	Medium	Rough regular
Plymouth	398	99.4	18.0	138	Large	Rough regular
Katahdin	368	99.0	17.5	145	M. lg.	Smooth regular
Boone	347	99.2	17.1	151	Large	Rough regular
Russet Burbank	320	97.2	18.8	153	Medium	Rough sl. irregular
Cherokee	320	98.4	18.0	141	Medium	Smooth irregular
Merrimack	305	97.9	19.7	151	Medium	Rough regular
Early Gem	302	98.4	16.7	134	Large	Rough regular
Irish Cobbler	290	97.3	19.3	133	Medium	Smooth regular
Tawa	247	97.1	17.5	134	Medium	Smooth regular
L.S.D. 5%	74		1.0			

Rhode Island table 2. Yield and other data for eight potato varieties grown at Kingston, Rhode Island, 1959.

Variety	Yield per acre		Total solids	Days to Maturity	Tuber size	Skin and shape
	U. S. No. 1					
	Cwt.	Pct.	Pct.			
B 2368-4	557	98.8	17.1	153	Large	Smooth rough
B 2368-13	457	98.4	18.6	153	Large	Smooth regular
Warba	355	97.5	17.3	143	Medium	Smooth irregular
3453-2	350	97.2	19.1	143	Medium	Smooth irregular
B 2874-4	319	96.4	18.6	145	Medium	Rough irregular
B 2894-24	247	97.5	16.0	145	Large	Smooth regular
Delus	239	98.6	18.4	143	Medium	Smooth regular
3428-31	148	86.8	17.3	143	Small	Rough regular
L.S.D. 5%	86		1.0			

SOUTH CAROLINA
W. R. Sitterly and W. C. Barnes

Potato Variety Trial (1959)

Purpose: To determine the performance of selected varieties under coastal South Carolina environmental conditions.

Field: C-5 was fertilized with 1,600 pounds of 6-8-6 per acre before planting and sidedressed with 30 pounds of nitrogen per acre. The field was planted February 18.

Plot plan: Randomized block, five replicates. Individual plots 1/400 acre.

Notes: Potatoes never developed properly. The season was too wet in the beginning and too dry at the critical time for good tuber development. Insects and diseases were not a problem.

Results: Of 13 potato varieties in the replicated trials, Nordak, B 73-3, and B 3428-20 were considered better than, or equal to, Sebago. As shown in South Carolina table 1, B 73-3 contained a significantly larger amount of dry matter than any other entry and generally held to standards established in previous years. Individual potatoes graded out a high percentage of No. 2 for the first time, but total yield was not significantly below that of the highest yielding entry and was equal to the check Sebago variety. B 3428-20 appears on the select list for the second year and is considered equal to Sebago in most respects, but is probably too late maturing. Nordak is a new entry with a good yield, good dry matter content, large size, and an appealing exterior. The bush is medium-small, erect, and compact.

In the overall test, Norgleam produced the largest yield, and B 73-3 had the highest dry matter content.

B 2368-4, B 3725-1 and Sebago had various amounts of internal and stem-end browning. Ia 1037-1 had 25 percent hollow heart of the larger tubers.

In the spaced planting trials, both Sebago and B 73-3 produced significantly higher yields at the 9-inch spacing than at the 12-inch spacing.

Conclusions: B 73-3 and Nordak were the two best entries in the replicated trials. Both Sebago and B 73-3 appeared to benefit from being planted on a 9-inch spacing.

Potato Observational Trial (1959)

Procedure: This trial was planted in Field B-9, with enough seed for observation only (3 replicates at most). The field was prepared the same as for the replicated trials. Extremely low yields were due to water damage caused by poor field drainage.

Results and Conclusions: As shown in South Carolina table 2, F 4613 and B 3279-13 were the best entries in the observational plantings. TL 1859 had poor tuber appearance; Manota had poor appearance and was late; B 3726-6 was poor in appearance and low yielding. Both F 4613 and B 3279-13 had acceptable dry matter content for this year, and both were fairly early and had decent appearance. F 503 had bad watersoaked interiors; B 3726-6 exhibited internal and stem-end browning. F 4613 and B 3279-13 will be put in a replicated trial in 1960.

South Carolina table 1. Characteristics of potato varieties tested in replicated trials at Charleston, South Carolina, 1959.

Variety	Total	Yield	Shape	Skin color	Maturity	Appearance
	solids Pct.	per acre Cwt.				
Nordak	15.7	104	Oval	White	ME	Good
Norgleam	14.8	115	Oval	White	ML	Fair-good
B 73-3 (9")	18.4	92	L-oval	White	ME	Good
B 73-3 (12")	17.9	48	L-oval	White	ME	Good
Bliss	14.7	103	L-oval	Red	E	Poor
Cobbler	15.5	88	Oval	White	E	Fair
Sebago (9")	14.5	95	L-oval	White	M	Fair-good
Sebago (12")	14.0	64	L-oval	White	M	Fair-good
B 2368-4	15.6	89	Oval	Red	M	Fair-good
B 3725-1	15.4	64	L-oval	White	ME-M	Poor
B 3428-20	15.5	76	Oval	White	L	Good
50B9-8	14.8	88	Oval	White	M	Fair
B 3428-4	15.8	64	L-oval	White	ML	Good
X 1276-185	14.6	93	Oval	White	M	Good
Ia 1037-1	14.7	76	Oval	White	E	Fair
LSD 5%	1.9	22				
LSD 1%	2.8	29				

South Carolina table 2. Characteristics of potato varieties tested in observational trials at Charleston, South Carolina, 1959.

Variety	Total	Yield	Shape	Skin color	Maturity	Appearance
	solids Pct.	per acre Cwt.				
Rushmore	14.9	48	Round	White	M	Poor
Kasota	13.0	40	L-oval	Red	ME-M	Fair-good
F 503	14.9	37	Oval	White	M-ML	Fair
B 3693-13	16.9	35	Oval	White	L	Fair
B 595-76			No Yield			
B 3140-36	14.3	30	Oval	White	M-ML	Good
B 3604-19	13.9	23	Oval	White	L	Good
B 3454-14	16.0	17	L-oval	White	M	Fair-good
B 3726-6	16.6	24	L-oval	White	E	Poor
ANT 80	13.9	30	Oval	White	ME	Fair-good

continued

South Carolina table 2, continued.

D 220C	13.9	35	Oval	Red	L	Poor
Manota	15.1	52	Oval	White	ML-L	Poor
B 2187-25	13.9	45	Oval	White	ME-M	Poor
F 4613	15.1	75	Oval	White	E-ME	Good
TL 1859	15.4	50	L-oval	Red	M	Poor
B 3279-13	15.6	58	Oval	White	ME-M	Fair

TENNESSEE (Crossville)

T. R. Gilmore

The 1959 growing season at the Cumberland Plateau, Tennessee was favorable for potato production.

The new red variety Catoosa produced the highest yield of the seedlings and varieties tested in the yield plot. For three years in succession this variety, formerly carried as seedling TL 6279 has outyielded other seedlings and varieties in the yield test. Only Tennessee-grown seed is used in these plots.

Tennessee table 1.--Potato yield test, Crossville, Tennessee, 1959.

Variety or seedling	Parentage	Yield per acre ^{1/}	
		U.S. No. 1	No. 2
		Bu.	Bu.
Catoosa	TL 1859 selfed	527	13
TL 6543	B2368-4 x B2997-9	494	7
LaSoda		454	8
TL 3633	1961 x B55T	404	8
TL 1859	Pontiac x X96-56	403	8
TL 6513	Teton x B3139-24	403	6
Kennebec		352	7
TL 6593	B3114-12 x B2997-9	312	11
TL 6043	B355-24 x B3160-12	282	7
Boone		258	6
TL 6035	B2219-1 x 96-56	244	10
TL 6445	B3006-22 x B2968-31	221	6
TL 6002	B874-35 x B2997-9	181	6
L.S.D. 5%		98	

^{1/} Mean yield from 3 replications of 25 hills.

TEXAS

Bruce A. Perry, R. V. Akeley, A. E. Kehr, D. M. McLean,
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Screening and Evaluation of Potato Varieties and Breeding Lines

The potato breeding program continued in 1958-59 toward its main objectives of the production of high yielding red and white varieties with resistance to common disease prevalent in the State. The program consisted of evaluating breeding lines in 5-hill plot planting at several locations within the State and growing seedling tubers and making hill selections.

Most of the 5-hill planted material was grown at 5 locations: 1) Lower Valley, 2) Winter Garden Station, 3) Crystal City, 4) Brazos Valley and 5) Prairie View. The planting at Prairie View was lost due to excessive rainfall and the one in the Brazos Valley was damaged by an early hail storm. The harvest period extended from May 4 to June 25 this season. A total of 380 breeding lines were grown and evaluated (Texas tables 1, 2, 3). From this material 130 selections were marked for repeat trials. In addition to the above planting, something more than 20,000 seedlings were grown in the Lower Valley and at the Winter Garden Station; from this material 238 single-hill selections were made. These selections came from 86 different families or parental combinations. The seedling selections were shipped to Presque Isle and planted immediately for seed increase. Texas table 4.

The Station Entomologist, James A. Harding, set up an insecticidal test using B 2368-4 as the tester plant; however, insect damage the past season was of such minor significance that yield data were not taken. Also the Winter Garden Station Agronomist, John M. Creel, Jr. set up a replicated test on spacing and rate of fertilizer application, using 6 and 12-inch spacings and 600 and 1200 pounds per acre 16-20-0 fertilizer. The 6-inch spacing produced 21,898 pounds per acre at the lower fertility level and 23,643 at the higher level. At the 12-inch spacing the yields were 27,135 pounds per acre at the 600 pound rate and 26,867 at the 1200 pound rate.

Texas table 1.--Re-evaluation in 1959 of potato breeding lines grown in Maine and replanted in 5-hill rows at 5 locations in Texas.

Pedigree No.	Parentage	No.		Repeat			Priority
		Skin	Loca-	color	tions		
B 313-21	Sequoia x 96-56	W	4	W	V	C B	1
B 605-10	Pungo x "	W	4	W		B	2
B 962-3	B 81-40 x (x245-186)	W	4			B	3
B 2368-4	Pontiac x 400-1	R	4	W	C		2
B 2368-11	" x "	R	4	W		B	2
B 2879-4	B 381-2 x B 874-15	R	4		C		3
B 3170-33	962-3 x 991-13	W	4	W	C	B	1
B 3428-20	606-37 x 929-32	W	4			B	3
B 3452-10	B 2162-36 x B 216-18	R	4		C	B	2
B 3599-8	B 2935-7 x B 3021-3	W	4	W	C		2
B 3626-15	B 595-76 x B 2067-52	W	4		C		3

Continued

Texas table 1 continued.

Pedigree No.	Parentage	Skin color	No. Loca- tions	Repeat			Priority
B 3833-24	B 294-3 x B 2209-25	W	4	W	C	B	1
B 3837-11	B 595-76 x B 294-38	W	4		C	B	2
B 3871-6	" x B 3139-24	W	4		C	B	2
B 3872-6	B 606-37 x "	W	4		C		3
B 3872-7	" x "	W	4		C		3
B 3884-2	B 2131-3 x Centitolia	R	4	W			3
B 3884-3	" x "	R	4		C		3
B 3903-7	LaSoda x B 2368-4	R	4	W	C		2
B 4083-3	Chippewa x Cherokee	W	4	W	C	B	1
B 4084-7	" x B 81-40	W	4		C	B	2
B 4084-8	" x "	W	4		C	B	2
B 4087-5	Early Gem x B 2834-3	W	4			B	3
B 4093-2	Menominee x B 881-12	W	4	W	C		2
B 4094-1	Russet Rural x B 3310-5	Ru	4	W			3
B 4094-18	" x "	Ru	4	W	V		2
B 4094-23	" x "	Ru	4	W			3
B 4105-18	792-14 x B 3139-24	W	4		C	B	2
B 4113-1	B 1395-57 x B 2834-3	Ru	4	W	V		2
B 4113-2	" x "	Ru	4	W			3
B 4116-5	B 2359-84 x "	W	4	W	C		2
B 4119-1	B 2368-4 x B 3186-6	R	4	W	V		2
B 4119-3	" x "	R	4		C		3
B 4128-2	B 2962-6 x B 2969-15	W	4		C		3
B 4130-12	B 3014-10 x B 929-32	W	4	W	C		2
B 4132-5	B 3097-82 x Katahdin	W	4		C		3
B 4132-14	" x "	W	4	W	C		2
B 4244-9	Merrimack x B 3139-24	W	4		C	B	2
B 4233-2	Delus x Cherokee	W	4	W	V	C	1
B 4246-1	Mohawk x Merrimack	W	4	W	C		2
B 4269-11	B 355-24 x B 3139-24	W	4		V	B	2
B 4269-16	" x "	W	4	W	C	B	1
B 4269-35	" x "	W	4	W	V	C	1
B 2447-2	B 929-32 x "	W	4	W			3
B 2447-7	" x "	W	4	W	C		2
B 2447-20	B 929-32 x B 3139-24	W	4		C		3
B 4302-9	B 2922-26 x B 3672-3	W	4	W			3
B 4302-27	" x "	W	4		C		3
B 4303-11	B 3097-82 x Minominee	W	4	W	V		2
B 4304-2	" x "	W	4	W	V	C	1
B 4304-3	" x "	W	4		C		3
B 4312-4	B 3309-8 x B 3139-24	R	4		C		3
B 4312-11	" x "	R	4		C		3
B 4314-3	B 3403-10 x "	W	4		C		3
B 4316-10	B 3454-5 x "	R	4		C		3
B 4316-13	" x "	R	4		C		3
B 4321-23	B 3707-4 x "	W	4	W			3
BL 4472-1	B 595-76 x B 3944-11	W	4		C		3
BL 4476-4	B 606-37 x "	W	4		V	C	2
BL 4476-5	" x "	W	4	W	V	C	1
BL 4495-1	B 3428-20 x B 3139-24	W	4		C		3
BL 4576-1	B 595-76 x Katahdin	W	4	W	C		2

Continued

Texas table 1 continued.

Pedigree No.	Parentage	Skin color	No. Loca- tions	Repeat	Priority
BL 4576-2	B 595-76 x Katahdin	W	3	W B	2
BL 4590-2	Pontiac x B 2368-4	R	3	W	3
BL 4593-2	Triumph x "	Pink	2	W	3
BL 4593-5	" x "	R	3	W	3
IL 5681-1	I 1107-3 x I 1077 W 28-5	W	4	W C B	1
IL 5681-2	" x "	W	4	B	3
IL 56287-6	X 927-3 x La 1859	W	4	W	3
IL 5711-1	I 801-10 x I 1077 W 28-5	W	4	W V C	1
IL 5742-1	" x "	W	4	C	3
IL 5742-2	" x "	W	4	W	3
IL 5742-3	" x "	W	4	C	3
IL 5757-1	I 1106-5 x "	W	4	C B	2
IL 5757-2	" x "	W	4	C	3
IL 5774-1	I 1133-1 x Katahdin	W	4	C	3
IL 5774-2	" x "	W	4	W	3
IL 5774-4	" x "	W	4	C	3
IL 57410-1	La 1354 x I 1027-18	R	3	W V	2
IL 57410-2	" x "	R	4	W C B	1
-	B 762-1 x Osage	W	3	V	3
-	B 762-46 x Minn. 113.43	W	4	C	3
-	Red Pontiac x Minn.92-36-5	R	4	C	3
-	I 1077 W 28-5 x I 902-2	W	4	C	3
-	B 2875-8 x I 1049-3	R	4	W C	2
-	I 781-7 x I 1106-1	W	4	W C	2
-	N.D. 2910-1 x (X95-56)	R	4	C	3

Texas table 2.--Selections made in 1958 from single-hill seedlings at Chapman Farm, Maine and grown at Winter Haven, Texas, 1959.

Pedigree No.	Parentage	Color
B 4446-1	B 595-76 x Katahdin	W
B 4461-3	B 3309-8 x "	R
B 4519-2	B 922-6 x B 3944-11	W
B 4523-1	" x B 3944-1	W
B 4546-1	WV 14-17 x Menominee	W
B 4563-2	A 163-28 x B 3099-5	W
B 4565-2	792-88 x A 180-30	W
B 4570-10	Kimebee x A 117-52	W
B 4590-5	Pontiac x B 2368-4	R
B 4590-6	" x "	R
B 4590-10	" x "	W
B 4591-2	LaSoda x "	R
B 4591-4	" x "	R
B 4591-5	" x "	Pink

Texas table 3.--Selections made in 1958 at Clear Lake, Iowa and grown at Winter Haven, Texas, 1959.

Pedigree No.	Parentage	Color
8141-1	44-13-8 x B 606-3	W
5501-1	I 801-10 x La 1859	W
5611-1	" x N.D.457-1	W
5686-3	I 1114-2 x Cherokee	W
56235-1	B 3139-24 x La 1859	W
56281-2	41956 x B 2368-4	Pink
56287-1	X 927-3 x La 1859	W
56287-2	" x "	W
56287-14	" x "	W
56288-4	Ac. 25953 x "	W
56288-8	" x "	W
56288-12	" x "	W
56319-1	OB 2905-1 x "	R
56334-2	OB 3612-1 x B 2834-3	W
56364-1	Green Mountain x La 1859	W
5704-4	I 801-10 x B 3139-24	W
5731-1	I 1027-18 x B 3309-8	R
57253-3	B 3556-1 x I 1077 W 28-5	W
57397-2	Ac. 25953 x La 1859	W
57410-4	La 1354 x I 1027-18	R
4528 Ia 1	B 3428-20 x B 3696-13	W
4547 Ia 3	WV 14-17 x Merrimack	R
4600 Ia 5	B 991-3 x B 2368-4	R
CS (58) 22-1	B 962-32 x B 991-3	W
La 6-31	La 92-167 x La 92-23	R
La Dyk 2-2	B 2857-8 x B 3131-8	R
ND 4563 Ia 2	ND 2774-3 x ND 3367-1	R
ND 4846 Ia 1	ND 4033-9 x I 1077 W 28-5	W
ND 4860 Ia 1	ND 4061-5 x B 929-32	W

Texas table 4.--List of selections made from 20,000 seedlings (single hills) grown in the Lower Valley and at the Winter Garden Station, Texas, 1959.

Pedigree No.	Parentage	Resistance in line	Selected ¹ /	Color ² /
4741-1	B991-14 x B 929-32	Lb, sc.r.rot, AI	W.H	W
4743-1	B 2969-13 x B 2968-31	Lb, sc	"	W
4748-1	B 3309-8 x Katahdin	Lb, sc, AI, YR, Vw, Lr.	Valley	W 2
4748-2	" x "	"	W.H.	R
4753-1	OB 3672-1 x OB3022-1	Hopper burn, net	W.H.	W
4753-2	" x "	" " "	"	W
4753-3	" x "	" " "	"	W
4753-4	" x "	" " "	"	W
4753-5	" x "	" " "	"	W
4759-1	Kennebec x Merrimack	Lb, r.rot, AI, YR, C.r.spot	Valley	W 1
4759-2	" x "	Lb, r.rot, AI, YR,	" "	W 2
4759-3	" x "	" " "	" "	W 2

Continued

Texas table 4 continued.

Pedigree No.	Parentage	Resistance in line	Selected ^{1/}	Color ^{2/}
4762-1	Mohawk x B 3944-29	Lb, r.rot, AI, YR, g.nem.	W.H.	W
4762-2	" x "	" " "	"	W
4762-3	" x "	" " "	"	W
4766-1	Sebago x A 180-26	Lb, sc, AI, Vw, russets	"	W
4766-2	" x "	" "	"	W
4767-1	" x B 2368-4	Lb, sc, AI, YR, net	Valley	R 1
4767-2	" x "	" "	"	R 2
4767-3	" x "	" "	"	R 1
4767-4	" x "	" "	"	R 9
4767-5	" x "	" "	"	R 1
4767-6	" x "	" "	W.H.	R 1
4767-7	" x "	" "	"	R 3
4767-8	" x "	" "	"	R 5
4767-9	" x "	" "	"	R 7
4768-1	" x B 3944-29	Lb,sc,r.rot,AI,YR,net,g.nem.	"	W 2
4768-2	" x "	" " "	"	W 3
4773-1	Yampa x B 3946-29	Lb,r.rot,AI,net,r.k.nem.	"	W 3
4773-2	" x "	" "	"	W 5
4773-3	" x "	" "	"	W 3
4775-1	47156 x B 3646-11	Lb,sc,Ai,YR,Lr,yellows	"	W 3
4778-1	A 180-26 x B3478-45	Sc,Lr,Vw,russets,net	"	Ru 5
4778-2	" x "	" "	"	" 2
4802-1	Ac26041 x "	Lb,sc,XI,AI,Vw,Lr,russets	"	" 2
4802-2	" x "	" "	"	" 2
4802-3	" x "	" "	"	" 4
4802-4	" x "	" "	"	" 1
4802-5	" x "	" "	"	" 7
4814-1	B 929-32 x B 4154-2	Lb, xc, Vw,Lr,XI,reds	Valley	W 4
4814-2	" x "	" "	"	W 6
4814-3	" x "	" "	"	W 3
4814-4	" x "	" "	W.H.	W 3
4814-5	" x "	" "	"	W 2
4820-1	B 2331-5 x B 2131-3	Lb, sc, reds	Valley	R 6
4820-2	" x "	Lb, sc, reds	"	R 7
4820-3	" x "	"	W.H.	R 5
4820-4	" x "	"	"	R 7
4824-1	B 2368-4 x B 3944-29	Lb,sc,r.rot,AI,g.nem.reds	"	R 9
4824-2	" x "	" "	"	W 3
4824-3	" x "	" "	"	W 2
4825-1	50 B 9 x B 2368-4	Lb, sc, Ai, Yr, Vw, reds	W.H.	W 5
4825-2	" x "	" "	"	R 3
4825-3	" x "	" "	"	R 7
4825-4	" x "	" "	"	W 3
4825-5	" x "	" "	"	R 3
4826-1	B 3097-82 x "	Lb, sc, r.rot, AI, reds	"	R 2
4826-2	" x "	" "	"	W 4
4828-1	B 3139-24 x "	Lb, sc, r.rot, AI, Vw, reds	"	R 1
4828-2	" x "	" "	"	W 3

continued

Texas table 4 continued.

Pedigree No.	Parentage	Resistance in line	Selected ^{1/}	Color ^{2/}
4840-1	B 3950-1 x B 2368-4	Lb, sc, XI, AI, reds	Valley	R 3
4840-2	" x "	"	"	R 3
4840-3	" x "	"	"	R 1
4840-4	" x "	"	"	W 2
4840-5	" x "	"	W.H.	R 1
4840-6	" x "	"	"	R 1
4840-7	" x "	"	"	W 3
4840-8	" x "	"	"	W 4
4841-1	" x B 3139-24	Lb,sc,r.rot,XI,AI,YR,Vw	Valley	W 2
4841-2	" x "	"	"	W 2
4841-3	" x "	"	"	W 2
4841-4	" x "	"	W.H.	W 3
4841-5	" x "	"	"	W 2
4841-6	" x "	"	"	W 2
4844-1	B 4146 x Cherokee	Lb, sc, r.rot, YR, g.nem.	Valley	W 2
4844-2	" x "	"	W.H.	W 2
4844-3	" x "	"	"	W 3
1076-1	Minn.113.43-1-45 sf.	Sc.	Valley	W 3
5518-1	I 801-10 x 872-4	Sc, Lb, XI	W.H.	W 3
5518-2	" x "	"	"	W 5
5518-3	" x "	"	"	W 4
5518-4	" x "	"	"	W 4
5518-5	" x "	"	"	W 4
5523-1	I 872-4 x B 3131-8	Sc, Lb, XI, reds	Valley	R 5
5523-2	" x "	"	W.H.	R 5
5523-3	" x "	"	"	R 5
5554-1	I 1077-16(X)	Sc, Lb.	"	-
55198-1	B 2875-8 x Katahdin	Sc, Lb, XI, reds	"	W 2
55198-1	" x "	"	"	R 3
55198-2	" x "	"	"	R 4
55198-3	" x "	"	"	W 3
55255R-1	Ackersegen x B 3131-8	Sc, Lb, XI, reds	W.H.	R 8
55299-1	P.I.194665 x I 1077-16	Sc, Lb, LR	"	W 3
55300-1	" x B 2834-3	"	"	W 2
55324-1	X927-3 x I 1077-16	"	"	W 3
55324-2	" x "	"	"	W 2
55324-3	" x "	"	"	W 3
55324-4	" x "	"	"	W 3
55326-1	" x B 2368-4	Sc, LR, reds	"	R 3
55328-1	" x B 2903-17	Sc, Lb, LR	Valley	W 2
55328-2	" x "	"	W.H.	W 3
5601-1	I 801-10 x La.1859	Sc, Lb, XI, reds	"	W 3
5602-1	" x Picha 51-4-532	"	"	W 3
5605-1	" x B 2368-4	"	"	W 2
5606-1	" x Red Kote	Sc, Lb, XI, reds	Valley	W 3
5606-2	" x "	"	"	W 2
5606-3	" x "	"	"	R 5
5606-4	" x "	"	"	R 7
5606-5	" x "	"	"	R 5
5606-6	" x "	"	W.H.	W 2

Continued

Texas table 4 continued.

Pedigree No.	Parentage	Resistance in line	Selected ^{1/}	Color ^{2/}
5606-7	1801-10 x Red Kote	Sc, Lb, XI, reds	W.H.	R 2
5606-8	" x "	"	"	W 3
5606-9	" x "	"	"	W 4
5606-10	" x "	"	"	R 7
5606-11	" x "	"	"	R 3
5613-1	" x B962-32	Sc. Lb, XI	"	W 2
5631-1	I 1015-2 x Katahdin	Sc, Lb.	"	W 2
5631-2	" x "	"	"	W 2
5636-1	I 1059-3 x "	Sc, Lb, reds	"	R 6
5636-2	" x "	"	"	R 8
5636-3	" x "	"	"	R 6
5637-1	" x La.1859	"	"	R 8
5637-2	" x "	"	"	W 3
5637-3	" x "	"	"	R 7
5637-4	" x "	"	"	R 9
5637-5	" x "	"	"	R 7
5639-1	" x B 2368-4	"	Valley	R 6
5639-2	" x "	"	"	R 9
5639-3	" x "	"	"	R 9
5639-4	" x "	"	W.H.	R 8
5639-5	" x "	"	"	R 7
56179-1	B 1396-N2 x ND 457-1	Sc. Lb, Y	"	W 3
56179-2	" x "	"	"	Ru 8
56179-3	" x "	"	"	W 2
56193-1	B 2368-4 x X96-56	Sc, reds	"	R 6
56194-1	" x ND 457-1	Sc, Y, reds	"	R 6
56194-2	" x "	"	"	R 2
46194-3	" x "	"	"	R 5
56259-1	B 3556-12 x B 962-32	Sc, Lb, XI, Lr	"	W 2
56260-1	" x La. 1859	Sc, Lb, XI, Lr, reds	"	R 3
56260-2	" x "	"	"	W 2
56260-3	" x "	"	"	R 5
56285-1	X 927-3 x X96-56	Sc, Lr.	"	W 3
56313-1	Neb.140.47 x B 2368-4	Sc, reds	"	R 9
56313-2	" x "	"	"	R 9
5707-1	I 801-10 x B 3556-12	Sc, Lb, XI, Lr.	"	W 3
5767-1	I 1111-10 x Katahdin	Sc, Lb, XI	"	W 2
5767-2	" x "	"	"	W 3
5767-3	" x "	"	"	W 3
5768-1	" x ND 2853-3	Sc, Lb, XI, reds	"	R 6
5768-2	" x "	"	"	R 9
5768-3	" x "	"	"	R 6
5768-4	" x "	"	"	R 9
5768R-1	" x "	"	"	R 6
5768R-2	" x "	"	"	R 6
5774-1	I 1133-1 x Katahdin	Sc, Lb, XI	"	W 2
5774-2	" x "	"	"	W 3
5774-3	" x "	"	"	W 3
5787-1	I 1193-1 x "	Sc, Lb, Y	W.H.	W 3

Continued

Texas table 4 continued.

Pedigree No.	Parentage	Resistance in line	Selected ^{1/}	Color ^{2/}
57155-1	B 24-58 x X627-164	Sc, Lr.	W.H.	W 3
57192-1	X2368-4 x Katahdin	Sc, reds	"	W 2
57232-1	B3403-10 x I 1165-14	Sc, Lb, XI, Y	"	W 3
57316-1	Cobbler x B929-23	"	"	R 2
57316-2	" x "	"	"	W 3
56317-1	" x B3319-20	Sc, XI, Vw.	"	W 3
56317-2	" x "	"	"	W 3
56317-3	" x "	"	"	W 2
56317-4	" x "	"	"	W 2
56317-5	" x "	"	"	W 2
56317-6	" x "	"	"	W 3
56317-7	" x "	"	"	W 3
56317-8	" x "	"	"	W 3
56317-9	" x "	"	"	W 2
56317-10	" x "	"	"	W 2
56317-11	" x "	"	"	W 4
57322-1	" x I 1077 W28-5	Sc, Lb.	Valley	W 4
57322-2	" x "	"	W.H.	W 3
57322-3	" x "	"	"	W 4
57324-1	" x I 1165-14	Sc, Lb, XI	"	W 2
57324-2	" x "	"	"	W 3
57324-3	" x "	"	"	W 2
57324-4	" x "	"	"	W 2
57324-5	" x "	"	"	W 3
57326-1	" x X96-56	Sc, Lb.	Valley	W 2
57326-2	" x "	"	W.H.	W 3
57327-1	" x La. 1859	Sc, Lb.	Valley	R 4
57327-2	" x "	"	W.H.	W 4
57337-1	Katahdin x ND 2853-3	Reds	"	R 6
57337-2	" x "	"	"	R 5
57337-3	" x "	"	"	R 7
57337-4	" x "	"	"	R 7
57338-1	" x X96-56	Sc, Lb.	"	W 2
57356-1	Red Pontiac x B 3309-8	Sc, Y, reds	"	R 8
57356-2	" x "	"	"	R 8
57356-3	" x "	"	"	R 7
57381-1	Rural x B 929-23	Sc, Lb, XI	"	W 4
57389-1	Sebago x X96-56	Sc, Lb.	Valley	W 2
57396-1	Sc25953 x Katahdin	Lb.	W.H.	W 3
57431-1	NO 2910-1 x I 1027-8	Sc, Lb, XI, reds	Valley	R 7
57431-2	" x "	"	"	R 6
57431-3	" x "	"	W.H.	R 7
57431-4	" x "	"	"	R 7
57318-1	Cobbler x B 3605-3	Sc, Lb.	"	W 4
5805R-1	I 781-7 x B 929-23	Sc, Lb, XI	"	W 4
5814R-1	I 801-10 x B 2368-4	Sc, Lb, XI, reds	"	R 1
5821-1	" x I 872-4	Sc, Lb, XI	"	W 4
5821R-1	" x "	"	"	W 3
5821R-2	" x "	"	"	W 3

Continued

Texas table 4 continued.

Pedigree No.	Parentage	Resistance in line	Selected ^{1/}	Color ^{2/}
58107-1	I 14147-2 x B 2368-4	Sc, Lb, XI, reds	Valley	R 8
58107-2	" x "	"	W.H.	R 8
58107-3	" x "	"	"	R 6
58116-1	I 8140-1 x I 14147-2	Sc, Lb, XI, reds	W.H.	R 5
58160-1	B 2368-4 x B 606-3	"	"	W 3
58162-1	" x I 1309-1	Sc, XI, reds	Valley	R 2
58162-2	" x "	"	"	R 6
58162-3	" x "	"	W.H.	R 8
58162-4	" x "	"	"	W 3
58164-1	" x Neb. 215.50-2	Sc. reds	Valley	R 2
58164-2	" x "	"	W.H.	R 8
58164-3	" x "	"	"	R 2
58164-4	" x "	"	"	R 7
58164-5	" x "	"	"	R 7
58164-6	" x "	"	"	R 7
58189-1	B 3309-8 x I 8140-1	Sc, Y, reds	"	R 6
58269R-1	La. 6618-2 x I 14147-2	Sc, Lb, XI, reds	"	W 3
58380R-1	Red Pontiac x I 1049-3	Sc, Lb, reds	"	R 7
58380R-2	" x "	"	"	R 6
58380R-3	" x "	"	"	R 6
58380R-4	" x "	"	"	R 9
58381-1	" x I 1309-1	Sc, XI, reds	"	R 8
58384R-1	" x I 14147-2	Sc, Lb, XI, reds	"	R 8
58389-1	" x B 3556-12	Sc, Lb, XI, Lr, reds	"	R 5
58391R-1	" x ND 3981-4	Sc, Lb, XI, reds	"	R 9

^{1/} W.H. = Winter Haven and Valley = Lower Rio Grande Valley areas.

^{2/} Color: The higher the number the more intense the color, e.g. Red LaSoda was taken as R 7.

VIRGINIA (Blacksburg)
Flood S. Andrews

Varietal Tests

Sixteen varieties and numbered lots of potatoes were grown in replicated test plots at the Virginia Agricultural Experiment Station, Blacksburg, Virginia, in 1959.

Experimental Procedure

Soil: Groschlose silt loam, pH 6.2; Previous crop: Sweet corn and cover crop; Plot size 3.5 feet x 30 feet; Plot arrangement: Randomized block with five replicates; tubers supplied by U. S. Plant Industry Station, Beltsville, Maryland, cut to 1-1/2 ounce pieces; Spacing 12 inches in the row; Fertilization: 1500 pounds per acre of a 5-10-5 applied 1000 pounds broadcast and the remainder applied in the row at the time of planting; Planting date: May 5th; Cultivation: shallow, frequent enough to control weeds; Pest Control: DDT plus malathion; Harvest Date: August 28th.

Results

Practically no sign of disease was found in any variety.

At harvest, potatoes were graded into U. S. No. 1s, U. S. No. 2s and culls. Culls were few principally under size second growth and mouse injury.

Andrews table 1.--Yield per acre and total solids of 16 varieties of potatoes tested at Blacksburg, Virginia, in 1959.

Selection or variety	Mean yield per acre			Total solids Pct.
	U.S. No. 1	U.S. No. 2	Total	
	Cwt.	Cwt.	Cwt.	
Red Pontiac	326.1 a	26.5	352.6	15.2 h
Pungo	292.5 b	9.5	302.0	17.7 bed
Kennebec	268.8 b	14.9	283.7	17.4 ef
B 3453-2	234.9 c	22.4	257.3	18.4 a
F 5025	233.8 c	17.0	250.8	17.9 abc
F 4713	227.7 c	13.3	241.0	17.75 bc
Cobbler	213.8 cd	18.1	231.9	18.2 ab
B 605-10	211.6 cd	11.2	222.8	18.1 ab
F 4613	209.9 cd	9.1	219.0	16.0 g
B 3309-14	208.3 cd	32.7	241.0	15.1 h
OB 2905-1	205.0 cd	17.8	222.8	16.5 fg
Merrimack	203.7 cd	11.2	214.9	18.5 a
X 1276-185	185.5 de	17.4	202.9	16.0 g
Boone	167.2 ef	15.6	182.8	15.1 h
Tawa	161.8 ef	15.8	177.6	17.1 def
B 2938-22	137.8 f	12.8	150.6	17.4 ede

Means not followed by the same letter are significantly different.

Andrews Table 1 shows the yields and total solids. Red Pontiac produced significantly higher yields than any other variety tested but it was one of the lowest in total solids. Pungo and Kennebec produced higher yields than the remaining varieties and the total solids were relatively high.

Varieties with satisfactory yields and relatively high total solids include B 3453-2, F 5025, F 4713, Cobbler, B 605-10 and Merrimack. F 4613 and B 3309-14 produced satisfactory yields but the total solids were low.

The remaining varieties including X 1276-185, Boone, Tawa and B 2938-22 produced relatively low yields and were low in total solids. In smoothness and appearance the Boone was excellent.

Potato Seed Source Studies

Potato seed source studies are conducted by the Department of Horticulture, Virginia Agricultural Experiment Station, Blacksburg, Virginia, in cooperation with the Virginia Truck Experiment Station, Norfolk, Virginia, and the Florida Agricultural Experiment Station at Hastings and Fort Pierce.

The purpose of the experiment is to evaluate the merits of Virginia-grown seed potatoes and productive capacity when grown at Blacksburg, Virginia; Norfolk, Virginia; Fort Pierce, Florida and Hastings, Florida and to evaluate the influence of storage temperature of seed potatoes on the production at the different locations.

Seed potatoes of five varieties grown in Maine and the same five varieties grown at Blacksburg, Virginia were held in storage at 40° F from harvest in September until planting time. Another lot of the same varieties of Virginia-grown seed was held in 55° F storage until time of planting. Subsequently, the five varieties from the two seed sources and two storage temperatures were tested for yield and for any evidence of disease at Blacksburg, Virginia. Three varieties of the different seed sources and different storage temperatures were tested at Norfolk, Virginia and three were tested at Hastings and at Fort Pierce, Florida. Records were kept of any evidence of virus or other disease. At harvest, yields of U. S. No. 1, U. S. No. 2 and total yields were recorded and calculated on the basis of CWT per acre.

SOIL: At Blacksburg the soil was a Groseclose silt loam; at Norfolk a fine sand; at Hastings and Fort Pierce, a Braden fine sandy loam.

PLOT ARRANGEMENT: Plot size at Blacksburg was one row 3.5 feet x 30 feet; at Norfolk, 2 rows 7 feet x 30 feet; at Hastings, one row 3.5 feet x 30 feet and at Fort Pierce, one row 3.5 feet x 40 feet. All test plots were randomized and replicated four or six times.

PLANTING DATES: Blacksburg - May 4,	HARVEST DATES: Blacksburg - Aug. 28,
Norfolk - March 13,	Norfolk - July 7,
Fort Pierce - Nov. 25,	Fort Pierce - March 10,
Hastings - Jan. 9, 1959.	Hastings - May 5.

Because of the planting dates, the length of time seed were held in storage varied widely for the different locations.

Results

SEED SOURCE: At Blacksburg, Virginia-grown Kennebec produced significantly higher yields than Maine-grown Kennebec. Maine-grown Pontiac produced significantly higher yields than Virginia-grown Pontiac. There was no significant difference between the seed sources of other varieties (Andrews table 2).

At Norfolk, there was no difference in yields between seed sources of any variety. At Fort Pierce and Hastings, Florida, Maine-grown Pontiac produced higher yields than Virginia-grown Pontiac. There was no significant difference in yields between seed sources of Kennebec and Sebago.

STORAGE TEMPERATURE: At Blacksburg, Kennebec and Cobbler stored at 40° F produced significantly higher yields than the same varieties stored at 55° F. The mean yield of Sebago, Pontiac and Pungo stored at 40° F were in all cases higher than the same varieties stored at 55° F but the differences, though considerable, were not great enough to be significant.

At Hastings and at Fort Pierce, Florida, the yield of Pontiac stored at 40° F produced significantly higher yields than Pontiac stored at 55° F. There was no significant difference in yields between Kennebec and Sebago potatoes stored at 40° F and those stored at 55° F.

VIRUS: At Blacksburg, Virginia, there was practically no evidence of virus disease. Less than 1 percent of Cobbler showed some symptoms of mosaic. At Norfolk, the Pungo stored at 55° F showed 54 percent leaf roll on May 19 and June 1. The same variety stored at 40° F showed only 2 percent on May 19 and 6 percent on May 24. At Fort Pierce, Florida, test plots of Pontiac stored at 55° F showed severe infestation of Virus Y while the same source and variety of seed potatoes stored at 40° F showed only a light infestation of the disease.

These data indicate that for seed potatoes held in storage until planting time in southwest Virginia, about May 1st, 40° F storage is more satisfactory than 55° F storage. For earlier plantings in Florida, November to January, and Norfolk, early March, the differences in yield of seed potatoes stored at 40° F and 55° F was sometimes higher than 40° F storage but these differences were not consistent with varieties nor from season to season. In 1958 at Norfolk, Virginia, three varieties of seed stored at 40° F produced higher yields than seed stored at 55° F but in 1959 only Pungo stored at 40° F produced higher yields than those stored at 55° F. In Florida in 1959 at Fort Pierce and Hastings, the Pontiac stored at 40° F produced higher yields than the same variety stored at 55° F; with Kennebec and Sebago varieties there was no significant difference in yield of potatoes from the two different storage temperatures.

It was interesting that Virus Y was very severe in plots of seed stored at 55° F while the same seed stored at 40° F showed only a slight infestation. In like manner, at Norfolk, Virginia, Pungo stored at 55° F developed a very serious infestation of leaf roll whereas the same variety stored at 40° F showed only slight infestation.

Considering the influence of storage temperature on yield and development of virus disease in different varieties, at different locations, the results seemed to be conditioned by the length of time in storage. There is some evidence that Virus Y and leaf roll may develop to a greater extent in seed potatoes stored at 55° than when stored at 40° F.

Andrews table 2.--The influence of seed source variety and location on yield of potatoes in Cwt. per acre at Blacksburg, Virginia; Norfolk, Virginia; Hastings, Florida and Fort Pierce, Florida.

Variety	Source	Blacksburg, Va.	Norfolk, Va.	Hastings, Fla.	Fort Pierce, Fla.
		U.S. No. 1	U.S. No. 1	U.S. No. 1	U.S. No. 1
		Cwt.1/	Cwt.1/	Cwt.1/	Cwt.1/
Cobbler	Maine	241.7 b	193.0 b		
Cobbler	Virginia	230.8 b	188 b		
Pungo	Maine	200.7 bcd	232 a		
Pungo	Virginia	232.3 b	229 a		
Kennebec	Maine	238.6 b	244 a	78.8 b	94.2 b
Kennebec	Virginia	305.0 a	246 a	105.8 b	99.2 b
Pontiac	Maine	300.3 a		154.4 a	151.0 a
Pontiac	Virginia	222.0 bc		87.6 b	96.2 b
Sebago	Maine	272.2 b		109.8 b	113.4 b
Sebago	Virginia	204.8 bed		96.1 b	85.8 b

1/ Statistical significance: Means not followed by the same letter are significantly different.

Andrews table 3.--The influence of storage temperature on yields of U.S. No. 1 potatoes in Cwt. per acre at Blacksburg, Virginia; Norfolk, Virginia, Hastings, Florida and Fort Pierce, Florida, 1959.

Variety	Storage Temp.	Blacksburg, Va.	Norfolk, Va.	Hastings, Fla.	Fort Pierce, Fla.
		U.S. No. 1	U.S. No. 1	U.S. No. 1	U.S. No. 1
		Cwt.1/	Cwt.1/	Cwt.1/	Cwt.1/
Cobbler	40	230.8 b	188.0 c		
Cobbler	55	132.2 e	154.0 c		
Pungo	40	232.3 bc	299.0 ab		
Pungo	55	203.3 cd	130 d		
Kennebec	40	305.0 a	246.0 ab	105.8 a	99.2 ab
Kennebec	55	187.7 cd	255.0 a	114.5 a	72.2 b
Pontiac	40	221.9 bcd		87.5 ab	96.1 ab
Pontiac	55	169.0 de		49.7 c	38.5 c
Sebago	40	204.8 bcd		96.1 ab	85.8 ab
Sebago	55	197.0 cd		72.4 bc	100.6 a

1/ Statistical significance: Means not followed by the same letter are significantly different.

VIRGINIA (Norfolk)

M. M. Parker

Sixteen seedling lot selections of potatoes obtained through the National Potato Breeding Program were planted April 6 at Norfolk for comparative purposes with six named varieties. Only two of the varieties in the test--Pungo and Cobbler--are planted commercially in eastern Virginia with the Pungo increasing in popularity and the Cobbler declining.

The seedpieces were dropped by hand twelve inches apart in the row with the rows three and one-half feet apart. Each plot consisted of one row two hundred seedpieces long and records were taken on the entire length of row.

Cultural treatments used in growing the potatoes consisted of planting in ground known to produce good yields of potatoes and which had been planted to a green manural crop of sorghum the summer prior to planting. One thousand pounds per acre of a 5-10-5 fertilizer mixture was broadcast before planting and at planting 2000 pounds of a similar mixture was placed in bands on each side of the seedpiece. The plots were irrigated whenever necessary throughout the growing season. Insects, which are more of a problem than diseases in eastern Virginia, were controlled by using appropriate insecticides with the last application being made against leaf hoppers and flea beetles just before the vines closed up the rows.

Shortly after the lots were harvested on July 1 they were evaluated and judged for fresh market use. The evaluation factors dealt principally with those things that had a direct bearing on the general appearance of the tubers and which enhanced or lowered their market value. Total yield also was given due consideration but it was not unduly emphasized.

The five best appearing selections, grown at Norfolk in 1959, are described below:

- 1) Iowa 1037-1 - white, medium size, very shallow eyes, smooth, roundish;
- 2) B 3696-13 - yellowish-brown, smooth, slightly russeted, roundish to oblong;
- 3) B3299-13 - dark brown, smooth, slightly russeted, roundish;
- 4) Pungo - light brown, fairly smooth, slightly russeted, roundish;
- 5) Tawa - white, smooth, some overly large and long potatoes. (Lots 3 and 4 had a rather large number of tubers with green sprouts at the apical end at harvest.

Imperfections that lowered the market appearance of some selections and placed many of them in a lower classification are described as follows:

- B 73-3 - prominent eyebrows, irregular shape and some second growth;
- B 605-10 - tended to turn greenish-yellow after being held in storage a short time;
- B 3319-30 - considerable soft rot in the field at digging, with a number of the sound tubers showing second growth;
- B3391-2 - some irregular shaped tubers and a bumpy type of second growth, considerable skinning at harvest, possibly because it is late maturing and was dug early;
- B 3696-13, B 2894-24, F 5025 and Pungo had rather large green sprouts at the apical end of some of their tubers at digging;
- B 3319-30 had a noticeable number of dumbbell shaped tubers.

Tawa had some tubers showing large brown watersoaked-looking areas covering about one-quarter of the potato. These spots had penetrated only slightly into the flesh, however.

Plymouth tended to be russeted, somewhat long and in some cases rather uniformly covered with small brown dots, taken to be either lenticels or scab spots and which gave a sandpapery skin effect.

Keswick produced large, irregular size and rough looking potatoes.

Cherokee did not look too impressive.

Because of widespread serious defects, the following selections do not seem to be worth testing again in Virginia:

- 1) B 3400-1, B 3604-19 and F 4613 were heavily infested with scab. More than half of the potatoes in each of these lots showed several lesions or pits per tuber;
- 2) B 3454-14 and B 3453-2, both red potatoes, were uniformly cracked over the entire surface, giving the effect of an alligator skin;
- 3) B 3400-1, B 3397-17, B 2894-24, and B 3095-18 produced very low yields, which in some cases was probably due to late maturity.

Parker table 1.--Potato yield trials at Norfolk, Virginia, 1959.

Variety	Yield per acre		
	A size	B size	Total
	Cwt.	Cwt.	Cwt.
B 605-10	178	9	187
Plymouth	178	6	184
Pungo	176	10	186
B 3299-13	172	9	179
Cobbler	166	17	183
F 4613	165	9	174
Iowa 1037-1	163	17	180
Tawa	160	14	174
F 5025	154	12	166
Cherokee	153	16	169
B 3696-13	144	17	161
B 3391-2	144	15	159
B 73-3	140	7	147
Keswick	130	12	142
B 3604-19	125	27	152
B 3453-2 (red)	113	17	130
B 3454-4 (red)	107	27	134
B 3400-1	103	10	113
B 3397-17	99	25	124
B 2894-24	99	11	110
B 3095-18	26	16	42

WASHINGTON
S. B. Locke

The spread of leafroll and mosaic viruses was very high in the test plots at Pullman during the 1959 season. Nearly all material that had been exposed more than two seasons was eliminated.

Notably, seedlings X1276-185, B579-3, and B2195-8 escaped leafroll infection, though growing next to plots which became totally infected. The latter seedling, though highly resistant in 1957, picked up considerable leafroll infection during the 1958 season. This points up the instability of the type of resistance carried by some of our seedlings.

The material carried in the 1959 test and its performance are indicated in Locke table 1.

The experience gained so far in this project would seem to indicate the inadequacy of field testing for leafroll resistance in a breeding program. More information on other methods is badly needed.

Locke table 1.--Survival of potato progenies under field exposure to infection by leafroll and other viruses.

Progeny numbers	Parentage	Numbers field tested					Surviving	
		1955	1956	1957	1958	1959	No.	Pct.
A327	(A119-15 x B24-58)	83	64	9	1	1	0	0.0
A328	(A101-7 x B24-58)	63	52	12	2	1	0	0.0
B2195	(Katahdin x X157-9)	155	50	20	2	1	1	0.6
B2301	(X1276-185 x X157-9)	602	186	88	6	4	0	0.0
A501	(B24-58 x A177-52)			112	16	1	0	0.0
A502	(B2759-5 x A163-17)			135	18	6	0	0.0
B2196	(Mohawk x X157-9)			169	32	5	0	0.0
B2215	(B247-48 x Triumf)			67	5	1	0	0.0
PX566	(Katahdin x A328-23)			179	24	5	0	0.0
PX5649	(A317-39 x A324-21)			314	3	1	0	0.0
PX5693	(B137-5 x Katahdin)			439	44	18	2	11.1
A535					66	3	1	1.5
A539					129	8	0	0.0
A548					177	9	4	32.2
A549					132	8	2	25.0
A551					137	6	0	0.0
A554					141	11	1	9.1
B2192	(Earlaine x X157-9)				165	8	0	0.0
B2196	(Mohawk x X157-9)				44	3	0	0.0
B2207	(Teton x X157-9)				264	12	0	0.0
B2213	(B247-48 x X157-9)				66	1	0	0.0
PX563	(Katahdin x Katahdin)				115	5	0	0.0
PX566	(Katahdin x A328-23)				248	12	0	0.0
PX5613	(A316-3 x A324-21)				421	4	0	0.0
PX5614	(A316-5 x A324-21)				9	1	0	0.0
PX5649	(A317-39 x A324-21)				157	3	0	0.0
PX5671	(A327-9 x A324-21)				119	1	0	0.0
PX572	(Earlaine x B2193-48)				51	10	0	0.0
PX576	(Mohawk x Earlaine)				680	13	0	0.0

Continued

Locke table 1 continued.

Progeny numbers	Parentage	Numbers field tested					Surviving	
		1955	1956	1957	1958	1959	No.	Pct.
PX5726	(B2193-48 x Katahdin)				208	17	1	0.5
PX5729	(B2193-48 x B24-58)				287	9	0	0.0
B2034	(Stakgeragis x X157-9)					8	0	0.0
B2203	(Sebago x X157-9)					35	0	0.0
PX5611	(A316-2 x A327-11)					16	0	0.0
PX5612	(A316-2 x A327-53)					32	0	0.0
PX5616	(A316-12 x Katahdin)					114	1	0.9
PX5617	(A316-14 x Katahdin)					63	0	0.0
PX5623	(A316-25 x A327-11)					15	0	0.0
PX5630	(A316-37 x A327-41)					142	2	1.4
PX5633	(A317-10 x Katahdin)					36	1	2.8
PX5635	(A317-10 x A327-53)					29	0	0.0
PX5638	(A317-19 x A327-16)					27	0	0.0
PX571	(Aquila x Earlane)					54	0	0.0
PX572	(Earlane x B2193-48)					373	1	0.3
PX573	(Green Mt. x Earlane)					342	5	1.4
PX576	(Mohawk x Earlane)					126	0	0.0
PX5715	(A317-29 x Katahdin)					43	0	0.0
PX5717	(A317-49 x A322-1b)					36	0	0.0
PX5721	(PX552-1 x B2193-48)					81	0	0.0
PX5724	(B2193-48 x B2193-48)					280	10	3.6
PX5725	(B2193-48 x Earlane)					1303	37	2.8
PX5726	(B2193-48 x Katahdin)					27	1	3.6
PX5729	(B2193-48 x B24-48)					407	2	0.5
PX5733	(PX553-1 x A3221b)					7	0	0.0
PX5735	(B2193-8 x B2193-8)					163	5	3.1
PX5818	(PX552-1 x Earlane)					631	4	0.6

Check Variety:

	Parentage	No.hills	No.	Pct.
		1959	L.R.	L.R.
B579-3	(B24-58 x Katahdin)	8	0	100
B2193-15	(Green Mt. x X157-9)	8	8	0
B2195-8	(Katahdin x X157-9)	8	0	100
W.P.57	(Virgil x B522-33)	4	4	0
X1276-185	(Houma x Katahdin)	3	0	100
Mohawk	(Green Mt. x Katahdin)	8	8	0
Netted Gem		820	820	100

WASHINGTON (Prosser)

William G. Hoyman

Sixty-six parental combinations were made in the greenhouse using parental stock having resistance to the common pathogens. Two parents, PI 208332 and PI 214372, have remained free of leafroll symptoms in exposure tests in Washington and Idaho, and were used extensively as male parents. Approximately 265,000 seeds were obtained from the 66 combinations.

Single-hill selections from the 1958 seedling plot were grown at Prosser and Mt. Vernon. A large percentage of them became infected with the leafroll virus at Prosser. From two years' testing in Washington, one of the most promising russet selections is F 91-2. It has shown resistance to leafroll and common scab but is susceptible to Verticillium wilt.

From the 1959 seedling plot of 8,500 plants, 95 single hills were selected for further trials in 1960. Eighty of the selected single hills had russet skin. Leafroll infection was severe and eliminated a large percentage of the seedlings.

In cooperation with the Washington State Nursery at Bellingham, the virus-free varieties Kennebec, Red Pontiac, Norland, Early Gem and F 29-1 were increased at an isolated location northwest of Bellingham. This foundation stock is available for increase by foundation seed growers.

Most of the parental stock was obtained from Dr. Darrel Bienz, Aberdeen Branch Station, Aberdeen, Idaho, and it had been tested for resistance to the pathogens causing leafroll and Verticillium wilt. A few parents were brought from North Dakota and some were furnished by Robert V. Akeley. These were grown at Prosser and their reactions to leafroll, virus Y and Verticillium wilt are shown in Washington table 1. Common scab readings have been omitted. Readings from Washington, Idaho, Maine and North Dakota indicated most of the parents were resistant. Myzus persicae, the greenpeach aphid, was abundant during June. All of the plants of some selections not included in the table showed current season leafroll symptoms.

Recent leafroll tests in Washington and Idaho have shown that B 2759-5, B 3820-14 and PI 214372 have remained symptomless. Bienz (1959 National Potato Breeding Program) reported a rolling in the lower leaves of PI 208332 but no questionable leafroll symptoms have been observed on this selection in Washington. B 2759-5 and B 3820-14 were among four of the selections (Washington table 1) showing no Verticillium wilt symptoms. These two selections remained free of virus Y symptoms.

Fifty-seven Solanum species and species hybrids (Washington table 2) previously reported resistant to the leafroll virus (Plant Disease Reporter 43:144-151) were planted at Prosser for a leafroll exposure test. Twenty-six did not emerge and the stand was inconsistent among the remaining 31. PI 208332 and PI 214372 were among the 18 showing no virus Y symptoms.

Forty Michigan selections (Washington table 3) were received from Dr. William J. Hooker for a leafroll exposure test. In addition to leafroll, the selections were exposed to virus Y, present in an adjacent plot, and to Verticillium albo-atrum. Myzus persicae was prevalent during June and July. Plants becoming infected with the leafroll and Y viruses were rogued as the symptoms appeared, and eliminated some plants that may have shown symptoms of Verticillium wilt.

Washington table 1. Reaction of parental stock to the leafroll and Y viruses and to Verticillium albo-atrum, Prosser, Washington, 1959.

Selection	Parentage	Reaction to:		
		Leaf roll	Virus Y	Verticillium albo-atrum
B 24-58	Imperia x Earline	0/39*	+	28/32*
F 26-1	Early Gem x B 2876-1	2/6	-	5/6
F 29-1	" " I 803-3	6/22	+	13/15
F 52-4	B 1396N2 x B 929-23	0/11	+	4/7
F 52-5	" "	0/7	+	1/2
F 52-8	" "	3/30	-	24/28
F 52-9	" "	4/10	-	6/8
F 91-1	I 801-10 x B 1396N2	8/71	-	36/36
F 91-2	" "	10/96	-	80/80
B 137-5	Sequoia x 47562	7/21	+	10/13
A 175-7	Early Gem x B 2913-24	1/11	+	0/6
A 180-2	" " B 2756-2	4/6	-	0/4
A 180-24	" " "	15/23	-	1/11
A 180-27	" " "	0/4	+	0/1
A 183-8	" " B 986-7	0/5	-	0/3
A 223-58	B 2102-11 x I 8186-25	2/4	+	0/3
A 321-1	White Rose x B 2834-3	3/6	+	0/3
A 374-2	A 163-4 x A 115-9	5/23	-	18/18
A 376-11	Early Gem x A 177-9	1/4	+	2/2
A 378-2	A 115-9 x A 124-116	2/9	+	1/6
A 378-7	" "	1/9	+	2/8
A 380-5	A 115-21 x A 124-116	6/14	+	1/9
A 380-15	" "	7/10	-	1/6
A 386-4	" A 177-9	3/5	+	2/3
A 394-1	A 119-15 x A 124-116	1/12	+	2/12
A 466-1	Kennebec x A 177-52	1/12	-	5/10
A 508-17	I 8186-25 x B 2102-11	3/4	-	1/1
I 912-6	B 67-11 x I 44-8-4	3/5	-	4/4
La 1859	Pontiac x X 96-56	1/7	+	1/1
B 2187-25	X 1276-185 x B 522-33	1/14	-	11/11
B 2759-5	B 24-58 x B 247-24	0/5	-	0/4
ND 3676-5	Netted Gem x ND 457-1	0/20	+	16/16
B 3820-14	B 927-3 x Katahdin	0/4	-	0/3

*The numerator denotes the number of plants showing symptoms and the denominator the number remaining when the final reading was taken.

Washington table 2. Reaction of some Solanum species and species hybrids to the virus-causing leafroll, Prosser, Washington, 1959.

PI Number	Name	Number plants	Reaction
<u>Solanum species</u>			
133656	chacoense (boergeri)	4	+
133708	" (parodii)	6	+
161695.1	tuberosum (andigena)	3	+
186177.4	" "	2	-
186180.1	" "	1	-
197758.7	chacoense	6	-
210065	tuberosum from Argentina	2	-
217391	Skerry Champion x Shamrock	4	-
222945	G 182 (a) 16 Claymore x Shamrock	4	-
222948	G414(a)142 Southesk x Peop	1	+
222950	G409(b)55 " Shamrock	3	-
230585	chacoense (vavilovii)	5	-
<u>Solanum species hybrids</u>			
201401	SSRPB 835a(4) (dem. x ryb. x tub.)	2	+
201402	" 1512c(16) " " "	5	+
201405	" 1647b(1) " " "	4	+
201406	" 1506b(9) " " "	6	+
203900	CB 4431-5 (dem. x tub)	4	+
203904	" 43154-5 " "	6	+
203905	" 44158-4 " "	6	-
208326	KOM C.199 (Ackersegen x 9089) 401 x Flava	3	-
208328	" C.298 " " " "	6	+
208329	" D. 148 Aquila x (Erdgold x 9089) 44	5	-
208332	" D.226 " " " "	5	-
208340	" F.558 B 150 x Aquila	3	-
208343	" F.672 Aquila x Y 73	5	-
208344	" F.754 " Y 202	1	-
214372	MPI 44.1004/5 S. andigenum in pedigree	4	-
214374	" 44.336/140 S. andigenum and S. demissum in pedigree	1	-
215618	SSRPB 2070(30) (dem. x ryb. x tub.)	3	+
222943	Cockerham 1591(b)9 (dem. x ryb. x tub.)	1	-
227680	Seedling 11-79	5	+

Washington table 3. Reaction of Michigan selections to the leafroll and Y viruses and to Verticillium albo-atrum, Prosser, Washington, 1959.

Selection	Number plants	Parentage	Number of plants with		
			Leaf roll	Virus Y	Verticillium albo-atrum
MS 464-LR3	2	X 927-3 x I 1107-4			2
MS 465-LR1	2	" B 3131-8			2
MS 469-LR3	1	" I 1077-W5	1		
MS 469-LR5	2	" "		2	
MS 520-LR9	3	I 1107-4 x X 927-3	3		
B 1492-LR2	3	B 294-38 selfed	1		
B 4056-LR3	4	Earlaine x X 927-3	1		3
B 4058-LR1	4	Houma x B 24-58	2	2	2
B 4058-LR2	2	" "	1	1	
B 4058-LR3	3	" "		3	
B 4058-LR8	4	" "	2		2
B 4058-LR13	3	" "	2		1
B 4058-LR19	4	" "			4
B 4058-LR21	5	" "	3		2
B 4058-LR25	4	" "	2	3	
B 4058-LR29	2	" "	1		1
B 4059-LR2	0	" B 294-38			
B 4060-LR1	4	" "		1	
B 4060-LR3	3	" "		1	
B 4060-LR5	3	" "	2		
B 4060-LR7	3	" "		3	
B 4060-LR8	3	" "	2		
B 4060-LR11	3	" "			3
B 4061-LR4	3	Katahdin x B 24-58			3
B 4061-LR5	2	" "			2
B 4061-LR15	3	" "	2	1	1
B 4064-LR1	3	B 24-58 x B 2963-7	1	3	
B 4064-LR3	1	" "		1	
B 4064-LR22	4	" "	3		1
B 4064-LR23	4	" "	3		
B 4064-LR25	3	" "	1	1	
B 4064-LR43	3	" "	1	1	
B 4064-LR44	2	" "		1	
B 4066-LR5	3	B 294-38 x X528-170			
B 4073-LR10	2	X927-3 x B 2963-7	1	1	1
B 4074-LR1	3	B 2925-23 x B 24-58	1	1	2
B 4074-LR4	3	" "		2	1
B 4074-LR10	3	" "			3
B 4074-LR16	3	" "	2		1
B 4074-LR20	3	" "		1	2

WEST VIRGINIA
K. C. Westover and J. R. Shumaker

The testing and selecting of varieties and seedlings for desirable horticultural characteristics was done at the Reedsville Experiment Farm (altitude 1800 feet) by the Department of Horticulture. The breeding and screening for disease resistance was carried on by the Department of Plant Pathology at Huttonsville, West Virginia (altitude 2000 feet) and in the pathological greenhouse in Morgantown. Insofar as practical, only seedstocks resistant to late blight were included in our plantings. In addition to the test plantings at Reedsville, isolated plantings of the new family lines and of all the seedstocks on trial at Reedsville were made in Canaan Valley, West Virginia (altitude 3250 feet). Here growing conditions with the possible exception of light compares favorably with those in Maine and maritime Canada. These plantings were frequently and thoroughly rogued by the plant pathologists and served to provide "clean" seedstocks of the varieties on trial as well as the current selections from new material.

Two harvests were made. The first, to perpetuate the selections on test when the young tubers were "set" size to take advantage of the relatively low incidence of disease infestation by insects. The last was at the normal harvest time to provide planting material of the current season's selections and also to provide planting stock for the coming season's trials.

Seasonal conditions at both locations--Reedsville and Canaan Valley were favorable. The plantings at Reedsville were on a deep, well-drained silt loam (Atkins) in good tilth. A heavy clover sod was turned under immediately before planting time. Soil (Unger) conditions at Canaan Valley were equally as good. The plantings at both locations were made by machine and each received a 1500-pound application of 5-10-10 commercial fertilizer bandwise at planting time. The rows in all the plantings were 36 inches apart and the spacing between the sets was 10 inches with exception of the 10-hill unit planting.

Family Line Planting. The twenty family lines totalling 2023 tubers received from Beltsville were planted at Canaan Valley. The distance between sets was 40 inches. Sixty-eight single-hill selections based primarily on tuber appearance and yield were made. A sample from each was screened for disease resistance. These selections will be used both in next season's "10-hill unit" planting at Reedsville and for increase purposes at Canaan Valley.

10-Hill Unit Planting. Seventy-eight units were planted from which 27 selections were made. The hills in the units were 20 inches apart and the units were separated by a 40-inch space to permit machine harvest. Check units of Cobblers and Sebagos, for comparative purposes, alternated every third unit in the row and were staggered in the rows across the planting so that each seedling unit was abutted or flanked by at least one of the "check" varieties and was not more than a row removed from the other. This year's 10-hill unit selections will become a part of next season's 50-foot row trial.

50-Foot Row Planting. Forty-three seedling selections and varieties were included in this planting from which nineteen have been retained for further trial. A single row of each was planted. Cobbler and Sebago check rows alternated every third row so that each selection on trial was flanked by one of the check varieties and was only a row removed from the other check variety. Plant descriptions were taken at the time of full bloom. At harvest two ten-tuber

samples from each seedstock were taken and immediately tested to determine the percent of total solids. West Virginia table 1 summarizes the data, other than plant description, from the selections made from this trial.

Replicated Planting. This planting included seventeen surviving seedling stocks from previous trials together with eight named varieties, some of which were on trial--the others being generally grown in the State. The planting consisted of four replications of a single 45-foot, single-row plot of each of the varieties in an incomplete block (lattice) arrangement. Standard spacings were used and at harvest, two 10-tuber samples were taken from each row for total solid determinations. West Virginia table 2 summarizes the data, other than plant descriptions, taken on the selections retained from this trial.

W. Va. table 1.--Yields, total solids and disease resistance information from selections from 45' row trials. Reedsville Experiment Farm, 1959.

Variety	Parentage	U.S. No.1's	Off ^{1/} Grade	Off Grade	Total Solids	Resistant to ^{2/}
		Cwts.	Cwts.	Pct.	Pct.	
I 1412-3 W.Va.	I 1077-W28-5 x 1902-3	258.5	12.9	4.8	23.2	S, IB _{1,2} ,X
I 915-4	B 76-23 x M113,43-1	245.6	13.5	5.2	19.1	S, LB,X
B 4267-2 W.Va.	96-56 x Ac26031	243.1	41.3	14.5	18.8	S, LB ₁ ,A
I 56328-3 W.Va.	OB3596-1 x Cherokee	238.0	22.1	8.5	18.8	S, LB,A,NN,LH
B 3718-4 W.Va.	Ac25953 x B 2131-3	234.2	29.7	11.3	20.2	LB _{1,3}
I 1089-4 W.Va.	B 6316 x Teton	232.3	15.2	6.1	18.4	S, LB ₁ ,RR
LA 1354 (I)	Pontiac x 92-36-5	217.2	19.9	8.4	18.7	
B 4295-6 W.Va.	B 929-32 x B 3556-12	217.2	19.2	8.1	17.0	LB ₁ ,S,X,A,VW,LR
I 1412-6 W.Va.	I 1077-W-28-5 x I 902-3	215.6	11.1	4.9	19.7	LB ₄ ,S,X
B 4362-4 W.Va.	B 922-3 x 96-56	210.6	15.1	6.7	19.3	LB _{1,2} ,A
B 4362-3 W.Va.	B 922-3 x 96-56	209.6	6.0	2.8	19.3	LB _{1,2} ,A
B 4302-5 W.Va.	B 2922-26 x B 3672-3	202.4	6.9	3.3	20.6	LB _{1,4} ,S,VW
B 4095-4 W.Va.	R New Yorker x B 2834-3	199.2	16.1	7.5	21.0	S,LR
Tawa (I)	B 595-76 x B 76-23	183.5	13.9	7.0	19.3	S,LB
B 4302-1 W.Va.	B 2922-26 x B 3672-3	168.7	15.7	8.5	21.3	S,VW
Plymouth	B 3014-10 x B 929-32	165.2	8.8	5.1	20.4	S,LB,A
B 4132-3 W.Va.	B 3097-82 x Katahdin	160.8	18.3	10.2	19.9	A,NN,S,LB,RR
B 4302-4 W.Va.	B 2922-26 x B 3672-3	155.4	12.6	7.5	23.6	LB,S,VW
B 4362-1 W.Va.	B 922-3 x 96-56	155.4	9.5	5.8	19.9	LB _{1,2} ,A
Cobbler	Ave. of 12 checks	191.0	16.1	7.8	19.8	
Sebago	Ave. of 12 checks	226.7	17.0	7.0	19.2	

1/ Off grade is based on total yield.

2/ LB = Late Blight (LB_{1,2}, contains resistance to R₁R₂ etc.), S = Scab, X = Virus X, NN = Net Necrosis, RR = Ring Rot, LR = Leaf Roll, VW = Verticillium Wilt, LH = Leaf Hoppers, A = Virus A

W. Va. table 2.--Yields, total solids and disease resistance information from selections from replicated trials. Reedsville Experiment Farm, 1959.

Variety	Parentage	U.S. No.1's	Off ^{1/} grade	Off grade	Total solids	Resistant to ^{2/}
		Cwts.	Cwts.	Pct.	Pct.	
Pontiac		285.6	13.9	4.6	17.2	
B 3715-4 W.Va.	Ac25953 x 3ZU-5	280.2	23.0	7.6	21.5	LB _{1,3}
B 69-16	Katahdin x X96-56	253.9	2.5	1.0	19.9	LB ₁
B 3710-3 W.Va.	Ac25953 x X96-56	244.5	10.2	4.0	21.3	LB _{1,3}
I 8140-I-La	I 45-11-26 x X96-56	243.1	15.1	5.8	22.2	S
B 3739-3 W.Va.	3 NC-9 x Ac25953	238.6	47.8	16.7	19.4	LB _{2,3}
I 1333-2 W.Va.	X 927-3 x I 1077-13	237.2	28.0	10.6	20.7	LB ₁ , LR
I 1324-8 W.Va.	B 595-76 x Osage	235.7	12.4	5.0	20.4	S, X, VW
Sebago		234.6	13.2	5.3	19.3	LB, S, A, YD
B 3754-5 W.Va.	3 XE-1 x Ac25949	230.0	58.6	20.3	19.2	LB ₃
Boone		229.7	0.4	0.2	18.0	LB ₁
B 2858-5 W.Va.	B 381-2 x Katahdin	214.6	7.3	3.3	19.7	LB
Katahdin		205.1	20.1	8.9	18.8	A, YD
Cobbler		198.4	21.0	9.6	20.2	W
B 3748-6 W.Va.	3YW-9 x B 3160-12	193.5	61.5	24.1	22.6	LB ₃
Chippewa		187.1	19.7	9.5	19.3	A
Delus		179.7	32.9	15.5	21.5	LB
I 1058-2 W.Va.	B 960-32 x B 762-46	175.4	16.2	8.5	19.5	LB ₁ , RR, S
B 3721-3 W.Va.	Ac25953 x B 3160-12	169.7	41.9	19.8	20.2	LB _{2,3}
Kennebec		164.2	8.9	5.1	20.8	LB ₁ , NN
I 961-1	I 44-8-4 x X96-56	153.2	14.3	8.5	18.8	S, VW
L.S.D. 5%		23.8			3.5	
L.S.D. 1%		30.7			4.6	

^{1/} Off grade is based on total yield.

^{2/} LB = Late Blight (LB_{1,2}, contains resistance to R₁R₂ etc.), S = Scab, W = Wart disease, YD = Yellow Dwarf, A = Virus A, A₂Y = Virus Y, RR = Ring Rot, NN = Net Necrosis, LR = Leaf Roll, VW = Verticillium Wilt.

WISCONSIN

R. H. Larson and R. V. Akeley

Nonparasitic Internal Tuber Necrosis

Testing for resistance to the nonparasitic internal tuber necrosis on Plainfield sand at the Hancock substation during 1959 included 3 named potato varieties and 5 seedling varieties. The indices of internal tuber necrosis are presented in Larson table 1.

Larson table 1. Incidence of internal tuber necrosis.

Variety	Necrotic Index ^{1/}
Hindenburg	76.91 ^{2/}
Ontario	58.47 ^{2/}
Boone	0 ^{2/}
B 3400-1	51.83
B 3391-2	18.33
B 2187-25	1.38
B 3329-13	1.10

^{1/} Randomized sample, 200 U.S. No. 1 tubers. Index: 0, all tubers free of necrosis; 100, all tubers with severe necrosis.

^{2/} Hindenburg and Ontario served as susceptible checks, and Boone as a resistant check.

WISCONSIN

F. J. Stevenson and C. E. Cunningham

Red Dot Potato-Breeding Program

Chip quality, like all other genetic characters in the potato, is highly complex. Our genetic studies are showing which parents have the highest dosage of genes for high quality chips and in what direction to proceed to get the greatest genetic gain.

We are making real progress in breeding varieties with high potentials for making superior chips and if we could control the many environmental factors that make or mar a high yield of high quality chips our job would be easy. Some of these factors are well known, but we are confronted with others that are not so well known. However, we are making progress as a careful reading of this report will show.

Seed

About 220 crosses and selfs were made in the greenhouse at Madison. Conditions again were very favorable for seed setting. The seed of each combination was threshed, dried, and measured in a graduated cylinder. The average number per cc found by counting the number of seeds in 5cc was used to estimate the number of seeds in the measured lots. It was estimated that more than 240,000 seeds were produced.

In making these crosses, parents were used that have been shown in previous tests to transmit superior chip quality, earliness, high specific gravity, resistance to A, X, leafroll, net necrosis, verticillium wilt, late blight, and scab.

New Seedlings

A total of 20,585 new seedlings representing 104 family lines were planted in the field on the Red Dot Research Farm, Rhineland, Wisconsin. 14,691 of these from 68 family lines were grown in the Red Dot greenhouse in Madison; 5,894 representing 36 family lines were received from Robert V. Akeley, Plant Industry Station, Beltsville, Maryland.

2,239 or about 11% of all the seedlings were selected for future tests on the basis of tuber shape, depth of eyes, and potential yield.

In the future tests chip quality will be given first consideration, but yield, market qualities and resistance to certain diseases, such as verticillium wilt, late blight and scab also will be studied.

Seedling Varieties Second Year in Field

In 1959 approximately 2,000 selections made from first year seedlings in 1958 were grown in 10- or multiple 10-hill rows. About 600 or 30% of these were selected again in 1959. Tuber samples of these are now in 50° and 42° storage. The first of the year they will be removed from storage. Those in 50° will be chipped directly from storage, those in 42° will be reconditioned about 4 weeks and chipped. The specific gravity of all samples will be determined.

Since earliness is given a high priority rating in our program, more than 80% of the selections were early or medium early in maturity.

Early Variety Test, Alabama, 1959

Eighteen early or medium early seedling varieties were planted in Alabama February 18, 1959. Four named varieties, Early Ohio, Kennebec, Plymouth and Russet Sebago were included for comparison.

All 22 varieties were planted in four randomized blocks. The plots consisted of two 20-hill rows. The seedpieces were cut and suberized at Rhinelander before they were sent to Alabama for planting. Two replications were harvested about May 26, the other two were harvested about 3 weeks later. Immediately after harvest, tuber samples were shipped to Madison where the specific gravity and chip color were determined.

The means of the two harvests for yield, percentage solids, chip color and calculated dry matter per acre are given in Red Dot table 1.

Red Dot table 1.--Early variety test, Alabama, 1959.

Variety	Yield per acre Cwt.	Solids Pct.	Chip color ^{1/}	Dry matter per acre ^{2/} Lbs.
Early Ohio	176	18.3	84	3221
Kennebec	202	16.9	85	3414
Plymouth	220	15.7	86	3454
Russet Sebago	231	15.7	87	3627
B605-10	185	17.4	81	3219
B721-35	183	16.5	85	3020
B926-9	159	15.8	85	2512
B929-23	193	16.6	84	3204
B3557-14	186	18.1	80	3367
B3641-1	150	15.2	79	2280
B4082-8	154	15.4	87	2372
B4084-13	242	16.1	85	3896
B4085-19	184	15.8	87	2907
B4097-20	165	17.9	84	2954
B4102-18	180	15.6	85	2808
B4103-13	133	17.4	87	2314
B4143-13	119	18.0	83	2142
B4144-4	122	16.9	80	2062
B4144-6	134	17.5	82	2345
B4144-10	77	17.6	87	1355
B4156-1	113	18.6	84	2102
B4160-11	119	16.3	75	1940
L.S.D. 5%	16			
Means	165	16.8	84	2751

^{1/} Chip color index. An index of 80 or higher is commercially acceptable.

^{2/} The dry matter was calculated as the percentage of solids multiplied by the yields.

Yield. B4084-13 with a yield of 242 hundredweight per acre ranked first. However, it was not significantly higher than Russet Sebago with 231 Cwt. per acre. Plymouth was in the same class as Russet Sebago. All others were significantly lower. B605-10 yielded 185 Cwt. per acre and, in the same class as the latter, were Early Ohio, Kennebec, B721-35, B929-23, B3557-14, B4085-19 and B4102-18.

Solids. The standard variety Russet Sebago was higher in solids at the first harvest than it was 3 weeks later. This was due no doubt to the rain and hot weather between the two harvest dates. Some of the others showed the same effect. This emphasizes the desirability of breeding early varieties for our work in Alabama. Some of the new seedlings look promising. Russet Sebago averaged 15.7% solids for both harvests. This was below the average of 16.8% for the 22 varieties.

Chip Color. The average chip color index was 84. There were only two varieties below 80 in color.

Dry Matter. The average calculated dry matter was 2,751. Russet Sebago yielded 3,627 pounds of dry matter. B4084-13 was the only one with a higher yield. Eight of the varieties yielded more than 3,000 pounds of dry matter per acre.

Late and Medium-late Variety Test, Alabama, 1959

Nineteen seedling varieties, late to medium-late in maturity were planted in the late varietal test in Alabama, about February 18, 1959. Eight named varieties were included in the test for comparison. The design and subsequent treatment of this test were the same as those described for the early varietal test.

Data for this test is found in Red Dot table 2.

Red Dot table 2.--Late and medium-late variety test, Alabama, 1959.

Variety	Yield per acre	Solids	Chip color ^{1/}	Dry matter per acre ^{2/}
	Cwt.	Pct.		Lbs.
Chippewa	209	14.8	79	3093
Early Ohio	155	18.4	85	2852
Kennebec	193	17.2	83	3320
Marygold	204	18.0	80	3672
Plymouth	200	15.9	81	3180
Pungo	191	17.5	87	3343
Russet Sebago	228	16.0	88	3648
Saco	243	17.4	80	4228
47156	174	18.8	81	3271
B73-3	153	17.9	86	2739
B3404-11	103	17.1	88	1761
B3428-31	126	15.4	85	1940
B3431-2	174	16.8	84	2923
B3444-25	130	16.1	83	2093
B3472-25	138	17.2	84	2374
B3604-17	174	16.9	87	2941
B3606-5	202	17.3	88	3495

Continued.

Red Dot table 2 continued.

Variety	Yield per acre Cwt.	Solids Pct.	Chip color ^{1/}	Dry matter per acre ^{2/} Lbs.
B3620-1	165	16.1	88	2657
B3626-5	118	17.5	89	2065
B3626-13	143	17.3	87	2474
B3627-18	184	17.6	84	3238
B4082-3	180	15.8	79	2844
B4083-7	210	15.5	85	3255
B4134-9	151	16.7	79	2522
B4144-2	197	17.6	80	3467
B4156-4	152	17.1	82	2599
B4160-9	170	15.7	78	2669
L.S.D. 5%	25			
Means	173	16.9	84	2913

^{1/} Chip color index. An index of 80 or higher is commercially acceptable.

^{2/} The dry matter was calculated as the percentage of solids multiplied by the yields.

Yields. Saco with a yield of 243 Cwt. of potatoes per acre ranked first in yield; Russet Sebago was second with 228 Cwt. Five others yielded more than 200 Cwt. per acre which is a relatively high yield for Alabama. The average for the 27 varieties was 173 Cwt. per acre.

Solids. The percentage solids in the first harvest averaged 17.1%, that of the late harvest 16.4%. The potatoes were more mature at the second than at the first harvest and it is usually assumed that the percent solids increases as the plants approach maturity.

The weather during the last 3 weeks induced higher yields, especially in some of the late varieties but the dry matter content did not keep pace.

Chip Color. Chip color for the average of both harvests averaged 84. Only 4 varieties showed a chip color index below 80, the minimum for superior chips.

Observation Plots. 178 seedling varieties were planted in 5-hill rows for observation. The plots were planted February 18 and harvested June 17. Tuber samples were sent to Madison where the specific gravity and color of chips were determined as soon as possible after arrival. Twenty-eight of these were selected to be included in the yield tests in Alabama in 1960. The plants of 17 of the 28 selections, by observation, showed good vigor, eight were above average in yield and 7 were above average in tuber size. Six of the selections were above average in all three categories: vigor, potential yield, and size of tuber. The percentage solids ranged from 15.6 to 20.1 with an average of 16.9%. They were all higher in percentage solids than Russet Sebago which averaged 15.3%.

The 1959 tests showed again the desirability of growing early varieties in Alabama. The percentage solids and dry matter per acre for several varieties were higher on May 26 than for the same varieties three weeks later.

Chips with excellent color were made from nearly all of the many varieties that have been grown in the test plots in Alabama, if the tubers are handled properly and fried soon after harvest. Among the 49 varieties in the yield test in 1959, Saco ranked first in yield but not significantly higher than Russet Sebago. Some second growth was observed on Saco, but the dry matter per acre was outstanding--4228 pounds.

Early Variety Test, Rhinelander, Wisconsin, 1959

In 1959, 30 named or numbered varieties of potato were planted in the early varietal test on the Red Dot Research Farm, Rhinelander. Early Ohio, Irish Cobbler and Kennebec were included as checks. On May 4 the varieties were planted in six randomized blocks. Twenty-five seedpieces per row, the hills one foot apart in the rows and the rows 3 feet apart. The plots were harvested August 10. The potatoes were graded and weighed and a tuber sample of each replication sent to Madison. Chips of all samples were fried during the week August 17 to 22. The data for yield, percentage solids, chip color, dry matter per acre and season of maturity are given in Red Dot table 3.

Red Dot table 3.--Early variety test, Rhinelander, Wisconsin, 1959.

Variety	Above 2"		Solids	Chip color ^{1/}	Dry matter ^{2/} per acre lbs.	Maturity ^{3/}
	Yield per acre					
	Cwt.	Pct.	Pct.			
I. Cobbler	176	85	20.7	85	4306	M
Early Ohio	160	83	19.9	88	3841	E
Ia. 8140-1	140	85	20.5	86	3383	M
Kennebec	177	89	20.0	88	4000	L
Tawa	168	89	20.0	89	3760	E
B73-3	177	92	21.0	90	4032	M
96-56	172	93	20.1	89	3698	M
B605-10	197	95	20.2	89	4202	M
B721-35	171	92	19.7	90	3645	M
B3404-11	163	82	19.4	90	3880	M
B3431-2	192	86	19.6	87	4371	E
B3472-25	132	80	20.7	88	3395	E
B3557-14	184	92	20.3	88	4080	E
B3584-5	148	86	19.4	85	3356	M
B3604-17	191	93	19.9	87	4099	M
B3606-5	182	93	20.5	90	3998	M
B3620-1	147	78	19.1	89	3610	E
B3622-4	135	84	20.4	89	3284	E
B3626-13	131	78	19.8	90	3326	E
B3749-5	126	72	21.1	89	3693	E
B4097-17	132	84	21.1	89	3313	E
B4099-4	159	84	20.4	89	3856	M
B4143-2	135	69	20.6	88	4038	E
B4144-1	136	90	20.1	88	3035	E
B4156-15	147	85	20.7	85	3560	M
ND3324-2	155	81	19.2	85	3667	E
Norland	204	94	19.4	87	4229	E
F4631	175	94	19.9	89	3701	M

Continued.

Red Dot table 3 continued.

Variety	Above 2" yield per acre		Solids Pct.	Chip color ^{1/}	Dry matter ^{2/} per acre lbs.	Maturity ^{3/}
	Cwt.	Pct.				
CS11889	135	89	20.2	86	3070	E
Ag29	206	96	20.5	88	4449	M
L.S.D. 5%	20		0.4			
Means	162	86	20.1	88	3763	

^{1/} Chip color 80 or higher commercially acceptable.

^{2/} Calculated from total yield of potatoes.

^{3/} Maturity: E = early comparable to Early Ohio, M = medium early comparable to Irish Cobbler, and L = late comparable to Kennebec.

Yield. The Early Ohio check yielded 160 Cwt. of potatoes above 2" in diameter per acre. The average for the 30 varieties was 162 Cwt. per acre. The least significant difference at the 5% level was 20 Cwt. Taking this into account, Early Ohio was outyielded significantly by 7 varieties. Fourteen of the other varieties were in the same class in yield as Early Ohio and the remaining 8 were significantly lower.

Yield. The Early Ohio check yielded 160 Cwt. of potatoes above 2" in diameter per acre. The average for the 30 varieties was 162 Cwt. per acre. The least significant difference at the 5% level was 20 Cwt. Taking this into account Early Ohio was outyielded significantly by 7 varieties. Fourteen of the other varieties were in the same class in yield as Early Ohio and the remaining 8 were significantly lower.

Solids. Early Ohio averaged 19.9% solids. Seventeen other varieties ranged from 20.0 to 21.1 percent solids. Statistically, several varieties excelled Early Ohio in percentage solids and several were lower but there were no large differences among any of the 30 varieties in the test. The mean for all varieties was 20.1% which is relatively high for the early test.

Chip Color. Chip color of the 30 varieties ranged from 85 to 90 with a mean of 88. A color index of 80 is commercially satisfactory so all varieties made chips with desirable color. This is further evidence that high quality chips can be made from many varieties of potatoes if the tubers are properly handled and tested soon after summer harvest.

Dry Matter. The dry matter was calculated from the total yields multiplied by the percentage solids. Ag. 29, a selection received from G. H. Rieman, University of Wisconsin, produced the highest weight of dry matter. Norland, a red variety from North Dakota, produced more than 2 tons of dry matter per acre. Eight others produced more than 2 tons per acre.

Maturity. On August 10, 15 varieties showed about the same degree of maturity as Early Ohio; 14 were in the same class as Irish Cobbler and Kennebec was scored late.

Medium and Late Variety Test Rhinelander, Wisconsin, 1959

In 1959, thirty-six varieties of potato were included in the medium and late variety tests on the Red Dot Research Farm, Rhinelander, Wisconsin. The varieties were planted in a triple lattice with 6 replications. Each row was planted with 25 seedpieces 12 inches apart in the row with rows 36 inches apart.

The data for yield of tubers above 2" in diameter, percent of such tubers, percentage solids, chip color and calculated dry matter per acre for 34 of these varieties are given in Red Dot Table 4.

The test as grown included 3 Kennebecs. One is included in the table for a check. The data for yield were analyzed according to the methods used for a triple lattice with 6 replications and for a randomized block design. The latter was found to give about the same precision as the triple lattice so was used in the analyses of the data for the 34 varieties presented in the table.

Yields. The least significant difference between variety means of potatoes over 2" in diameter was 39 Cwt. Considering this, only 2 varieties, Saco and B4083-7, outyielded the Kennebec check. Chippewa, Marygold, Mohawk, Plymouth, Pungo and Russet Rural were in the same class as the check but all others were lower in yield than Kennebec. All varieties produced potatoes above 2" in diameter in from 90 to 99% of their total production. The average for the 34 varieties was 97%.

Solids. The percentage solids for the 34 varieties ranged from 17.3 to 21.8% with an average of 19.1%. On a statistical basis, 5 varieties, Delus, Navajo, Russet Rural, 47156 and F5312 were significantly higher in percentage solids than Kennebec. Twenty of the others were in the same class as the check in dry matter content.

Chip Color. Chips made from 19 varieties scored 80 or higher in color. With a least significant difference of 4, seven varieties were significantly higher in color than Kennebec and 4 were lower. B3620-1 graded 90 in color.

The chips were fried before the tubers were placed in cold storage and more of them should have scored above 80. However, a killing frost occurred the day before the plots were harvested. On the day the tubers were dug the internal temperature of some of them was 38°F. This low temperature no doubt affected chip color.

Dry Matter Per Acre. The dry matter per acre was calculated by multiplying the total yield per acre by the percentage of solids. Saco produced the highest yield with 470.8 Cwt. per acre, and it was among the highest in solids with 20.1 percent. As a result it was outstanding in dry matter with 9463 pounds per acre.

Tuber Shape. The tuber shapes of the highest yielders, Saco, Russet Rural, and B4083-7 were rough. Second growth in the form of knobs was prevalent. The tubers of Chippewa were rough which is unusual for this variety. Perhaps closer planting would eliminate some of the roughness, although the latter part of the growing season was conducive to second growths.

Red Dot table 4.--Medium and late variety test, Rhinelander, Wisconsin, 1959.

Variety	Above 2"		Solids	Chip color ^{1/}	Dry matter ^{2/} per acre
	Yield per acre				
	Cwt.	Pct.	Pct.		Lbs.
Blanca	272	95	19.9	80	5689
Chippewa	393	97	17.7	75	7174
Delus	315	99	21.8	81	6926
Katahdin	311	97	18.4	81	5870
Kennebec	389	99	19.4	81	7661
Manota	284	96	20.1	77	5974
Marygold	365	98	18.8	74	6971
Mohawk	363	99	19.7	83	7230
Navajo	237	90	20.5	84	5392
Plymouth	363	99	17.3	76	6353
Pungo	378	99	18.2	78	6965
Russet Sebago	338	97	19.9	85	6965
Russet Rural	380	96	21.4	76	8511
Saco	446	95	20.1	81	9463
B73-3	336	98	19.9	79	6852
B605-10	290	98	19.0	78	5635
B3410-18	221	96	18.6	81	4291
B3431-2	297	97	18.2	79	5562
B3603-28	257	93	18.6	86	5126
B3604-17	306	98	18.0	81	5616
B3620-1	316	97	17.3	90	5655
B3627-18	283	96	19.2	80	5635
B4083-7	428	97	18.4	78	8092
B4090-55	342	98	18.4	78	6414
B4097-22	305	97	19.7	81	6198
B4144-4	239	98	17.7	77	4319
B4144-5	262	97	18.2	86	4941
B4160-14	270	97	18.8	88	5232
47156	260	97	20.7	78	5537
CS11888	247	98	19.0	78	4784
CS11889	227	98	19.0	83	4408
F5312	309	96	20.5	86	6554
Is 8140-1	333	97	20.3	85	6959
ND2774-32	252	95	18.0	78	4793
L.S.D. 5%	39		1.1	4	
Means	312	97	19.1	81	6169

^{1/} Chip color 80 or higher commercially acceptable.

^{2/} Calculated from total yield of potatoes.

Chip Color

The Red Dot report for 1958 stated that many of our selections were in cold storage and would be tested for chip color in the winter of 1958-59. A brief summary of the results obtained follows:

Chip Color from 50° Storage. Many varieties stored for about 3 months at 50° and fried directly from storage gave chips with excellent colors. Seventeen

of the 29 varieties from the late variety test Rhinelander scored from 81 to 89 in color when fried direct from 50° storage. Eleven of them scored 75-79 and one scored 71.

Chips of 6 of the 14 varieties selected from the increase plots scored from 84 to 90. Among these were Katahdin and Merrimack. The chips of Saco scored 79. USDA seedling variety 96-56, one of the parents of Kennebec, scored 90 in color. Chips made from 55 selections from Beltsville seedlings, grown the first year at Rhinelander in 1956, ranged in color from 70 to 89 with an average of 78. Sixteen of them scored from 80 to 89 with an average of 84.

From nearly 1650 seedling varieties grown in 10-hill rows, 455 selections were made and samples of the latter were stored at 50° for about 3 months. Chips made from 125 of these selections fried as soon as removed from storage, scored from 81 to 90 in color, and 148 others ranged from 76 to 80. It is evident that excellent chips can be made from the tubers of many varieties if the potatoes are stored at 50°.

Chip Color 42° Storage. It seems desirable to store tubers at a temperature much lower than 50° and to breed varieties from which good quality chips can be made as soon as removal from cold storage or as soon as possible after removal.

In the fall of 1958 tubers of the 29 varieties from the medium and late variety test at Rhinelander were stored at 42° for about 4 months, reconditioned for about 4 weeks at 75° to 80°, and chipped. Seventeen of them produced chips that ranged in color from 80 to 89.

Fourteen new varieties that were tested for yield and increased were stored at 42° and conditioned at 75° to 80° for four weeks. The color of the chips made from these varieties ranged in color from 77-89. Nine of the best of these were turned over to the seed farm for increase.

466 selections from the 10-hill rows were stored for at least 4 months, reconditioned for about 4 weeks at 75° to 80°, and fried. The chip color of 14 of these graded 86-90, 31 were scored from 81-85, and 81 of the others scored from 76-80. A number of these have been increased and are now in storage at 38° where they will remain for about 4 months. After that time, they will be removed from cold storage and held at 75° to 80°. The tubers of these varieties will be chipped at weekly intervals to determine the rapidity of their reconditioning characters.

Verticillium Wilt Tests Rhinelander

Methods. For the verticillium field test at Rhinelander, the fungus was grown on agar at Madison in the early spring. At Rhinelander the seed potatoes were cut, the seedpieces were dipped in a slurry containing verticillium organisms and planted in moist soil as soon as possible after treatment. Kennebec was planted after every tenth variety as a check. The plots were planted June 2, 3 and 4. The planting was done at this time to assure a relatively high soil temperature.

First Year Test. The first year verticillium wilt test included 1009 selections from 53 family lines. Twenty-one family lines produced in the aggregate 89 resistant seedlings. Thirty-nine lines produced 160 seedlings showing an intermediate reaction and 760 seedlings showing a highly susceptible reaction to wilt.

Second Year Test. In 1959, sixty-nine seedling varieties that showed no symptoms or questionable symptoms of verticillium wilt in the 1958 test were tested again in 1959. Thirty-nine of the 69 varieties showed a trace or no symptoms in the tests for both years. This indicates a high degree of resistance since all of the Kennebec checks showed a moderate to heavy degree of vine infection. These varieties will be tested again in 1960. Some of them have been used as parents in the breeding and genetic studies of resistance.

Tuber Resistance. Some varieties such as Kennebec are injured by the verticillium fungus in 2 ways. The yield of potatoes is reduced by vine infection and the flesh of some of the tubers becomes necrotic, resulting in a further reduction of yield of acceptable chips per acre. The vines of some varieties may be moderately to severely injured by the fungus but the tuber flesh escapes injury.

Samples of tubers of many of the varieties in the test were saved and after a certain storage period will be examined for necrotic areas in the flesh. It may be easier to breed varieties that are immune from tuber flesh necrosis than to produce varieties immune from vine injury. However, a relatively large number of seedling varieties seem to be commercially resistant, that is, they would probably escape vine infection when grown by the best commercial practices.

WYOMING
William A. Riedl

The potato breeding work in Wyoming in 1959 consisted primarily of breeding for red skin varieties, resistant to scab, with high yield of desirable type tubers having good cooking quality.

Eighteen seedling families were grown. Several promising selections were made for further testing. One hundred sixty selections were grown in 4-hill units for observation. The best of these have been saved for further study. Fifty-five selections were tested in 15-hill rows and seventy selections were grown in a 25 hill-row yield trials. Eighteen promising seedlings were grown in a yield trial at Laramie. The trial consisted of one-row plots 40 feet long with 4 replications. Another yield trial, similar to the above, contained 18 varieties. In addition, 18 varieties and promising seedlings were grown in a similar yield trial at the Torrington Substation and 12 at the Powell Substation.

The total yield and the yield of U. S. No. ones (over 2-inch screen) were obtained. The percent of U. S. No. ones and percent of total solids were also determined. The results of the four yield trials are given in tables 1, 2, 3, and 4. Eight promising seedlings were increased at Laramie, and three were increased at the Torrington Substation.

Wyoming table 1. Potato Variety Trial, Laramie, Wyoming, 1959.

Variety	Total per acre	U.S.No.1 per acre	Rank of U.S.No.1	U.S.No.1 Pct.	Stand Pct.	Total solids Pct.
	Cwt.	Cwt.				
Red McClure	<u>234</u>	181 *	2	77	91	22.3
Kennebec	224 *	171 *	4	76	88	20.5
LaSoda	216 *	<u>193</u>	<u>1</u>	89	95	21.2
Red Pontiac	210 *	<u>177</u> *	3	84	99	18.8
DeSoto	193	160 *	5	83	89	19.9
Satapa	182	152	6	84	91	20.1
Russet Burbank	179	101	14	56	94	21.4
Flava	179	101	14	56	79	-
Cayuga	179	143	8	80	84	22.5
Yampa	177	152	6	86	91	21.8
Progress	154	115	11	75	84	18.6
Redglo	151	129	9	85	76	19.7
Early Gem	151	105	12	70	95	18.8
Norland	133	118	10	89	96	18.2
Teton	128	104	13	81	94	20.5
Sheridan	123	96	16	78	75	21.0
Redbake	117	94	17	80	61	21.4
Bliss Triumph	115	92	18	80	78	19.5
General Mean	169	132		78	87	20.4
L.S.D. 5% level	31	38				

*Statistically equal to highest yield at 5% level.

Previous crop, fallow 1958, alfalfa 1957; planted May 25; one-row plots 40 feet long, with 4 replications; rows spaced 3 feet apart with hills spaced 1 foot apart in the row; irrigated July 15, August 4 and 21; dusted with sulphur and 5% DDT July 13, August 4 and 20; harvested Oct. 7 and 8.

Wyoming table 2.--Potato seedling trial, Laramie, Wyoming, 1959.

Variety	Total per acre	U.S.No.1 per acre	Rank of U.S.No.1	U.S.No.1	Stand	Total Solids
	Cwt.	Cwt.		Pct.	Pct.	Pct.
W 2753	264	209	1	79	96	--
W 2650	230*	174*	4	76	85	19.0
W 2598	228*	189*	3	83	91	21.4
W 2550	211	154*	7	73	91	19.7
W 2803	208	194*	2	93	98	20.3
W 2549 L	191	130	10	68	88	20.8
W 2578	184	171*	6	93	86	19.7
W 1122	184	159*	5	86	91	19.5
W 2549 S	178	122	12	69	88	--
W 2548	170	140	9	82	81	20.5
W 2587	160	126	11	79	86	--
W 2790	157	145	8	92	86	--
W 2787	154	122	12	79	83	19.3
W 2784	146	117	14	80	64	21.0
Bliss Triumph	141	101	15	72	86	19.5
W 2722	127	85	18	67	88	--
W 2807	126	97	16	77	71	16.9
W 2542	125	97	16	78	90	--
General Mean	177	141		79	86	19.6
L.S.D.5% level	40	46	*See footnote in Wyoming table 1.			

Wyoming table 3.--Potato variety trial, Torrington Substation, 1959.

Variety	Total per acre	U.S.No.1 per acre	Rank of U.S.No.1	U.S.No.1	Stand	Total Solids
	Cwt.	Cwt.		Pct.	Pct.	Pct.
W 2650	390	192	10	50	78	15.6
Red Pontiac	362*	245	3	68	89	16.5
Irish Cobbler	358*	199	9	56	83	17.9
W 2598	356*	303	1	85	93	16.3
La Soda	355*	217	5	61	91	16.7
W 2578	334*	277*	2	83	81	17.5
Chippewa	289	216	6	75	60	16.1
Bliss Triumph	286	140	16	49	72	16.3
Redglo	267	213	7	80	88	17.3
Sheridan	257	187	12	73	63	18.6
Teton	257	183	13	71	62	17.3
W 2548	245	224	4	91	59	17.3
Norland	244	200	8	82	48	17.3
W 2753	242	178	14	78	76	16.9
W 1122	239	153	15	64	81	17.1
Kennebec	232	136	17	59	56	16.7
Redbake	228	191	11	84	71	19.3
W 2542	217	100	18	46	59	16.9
General Mean	287	197		69	73	17.1
L.S.D.5% level	85	49				

*Statistically equal to highest yield at 5% level.

Previous crop, alfalfa; date planted, June 4; planted in one-row plots 35 feet long, with 4 replications; rows spaced 3 feet apart, with hills spaced 1-foot apart in the row; irrigated 4 times; dusted with sulphur and 5% DDT 3 times; harvested September 30.

Wyoming table 4.--Potato variety trial, Powell Substation, 1959

Variety	Total per acre	U.S.No.1 per acre	Rank of U.S.No.1	U.S.No.1	Stand
	Cwt.	Cwt.		Pct.	Pct.
W 2650	<u>312</u>	223*	3	72	95
Red Pontiac	293*	<u>247</u>	<u>1</u>	84	77
Kennebec	271*	<u>234</u> *	<u>2</u>	86	92
Bliss Triumph	257*	209*	6	81	82
La Soda	250*	197*	8	79	80
W 2598	241*	218*	4	91	87
Redglo	241*	209*	6	87	88
W 2578	238*	215*	5	90	78
Teton	234	188*	10	80	81
Sheridan	214	195*	9	91	77
Red McClure	196	162	11	83	85
Redbake	116	103	12	89	43
General Mean	239	200		84	80
L.S.D.5% level	76	74			

*Statistically equal to highest yield at 5% level.

Previous crop, alfalfa; date planted, June 2; planted in one-row plots, 30 feet long with 4 replications; rows spaced 3 feet apart, with hills spaced 1 foot apart in the row; harvested, October 5.